

The DAIRY HERD

Judging-Selecting
Breeding-Feeding

By

J. A. McLEAN.



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Foreword

DAIRYING is the most important live stock industry of the American nation.

Cereal, flour and feed manufacturing are the three inseparable phases of the business of The Quaker Oats Company.

Between the dairy industry and the various branches of the business of The Quaker Oats Company, there is an intimate, vital relationship. The success of the dairy industry has an important bearing on the prosperity of The Quaker Oats Company. That this Company may securely establish and build its business, it endeavors to render constantly to a full extent, genuine service to the live stock industry. As one phase of that service this booklet is prepared, with the hope that it may carry both inspiration and assistance to the man whose life's work is intimately associated with dairy cattle.

The Quaker Oats Company



Owner: Penshurst Farm, Narberth, Pa.

Introduction

PROGRESS can be made only according to some definite plan. Haphazard methods never give permanent results.

We have studied the plans followed by the leading dairymen of America for many years. We have taken the best from the practices of men who are winning with dairy cattle, who are successful, who are making profits, who are building up their farms, their herds and their reputations, and whose families are reaping the benefits of proper planning properly followed. We have taken the best information regarding dairy cattle from the text books and from the teachings of the nation's outstanding teachers and investigators. All this we have incorporated in the briefest, most direct and most usable form in "THE DAIRY HERD."

"THE DAIRY HERD" tells how to select good cows, how to improve the herd, the essentials of a good sire, how to care for cows and young stock, how to feed and care for the milking herd. The different parts are arranged in chapters; each chapter is vitally interesting and each is independent of the others.

Every step as outlined in "THE DAIRY HERD" has been practiced by thousands of people in all parts of the country. Every dairyman who has succeeded has followed some or all of its features. Every man who desires to succeed quickly, surely and permanently, can best do so by following the practices herein outlined.

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Acknowledgment

The first two chapters of this booklet were originally published in almost their present form in "The Field Illustrated." The author received so much commendation for the series of articles in which they appeared, that he obtained permission to reproduce them. They appear here with but very few changes.

We appreciate the co-operation of "The Editors of The Field" in this matter.

CHAPTER I

JUDGING DAIRY COWS

THE chief function of the dairy cow is the economic production of milk. She may be fairly described as a manufacturing plant capable of producing a finished food product for human consumption from coarse, bulky, relatively inexpensive raw materials such as hay, silage, roots, farm grains and grain by-products which would otherwise be wasted. From the farmer's standpoint the dairy cow furnishes a market for essential farm crops that would otherwise be difficult to market because of their bulk and their restricted use. From the consumer's standpoint she furnishes a large quantity of unexcelled food for man, at a lower cost than usually obtains for any other animal food. Until some other animal develops the ability to furnish the most profitable market for certain farm products on the one hand, or to supply mankind with essential food constituents most cheaply on the other, the dairy cow will continue to increase in numbers and in importance in the agricultural world.

In judging or selecting dairy cows one must always emphatically bear in mind this function of economic production. As a manufacturing plant the cow must be able to take on and digest a lot of raw materials such as hay, silage and roots; she must have the ability to thoroughly assimilate this raw material and convert it into blood constituents; she must have the apparatus for secreting this material in the form of milk; and she must have the disposition to do so.

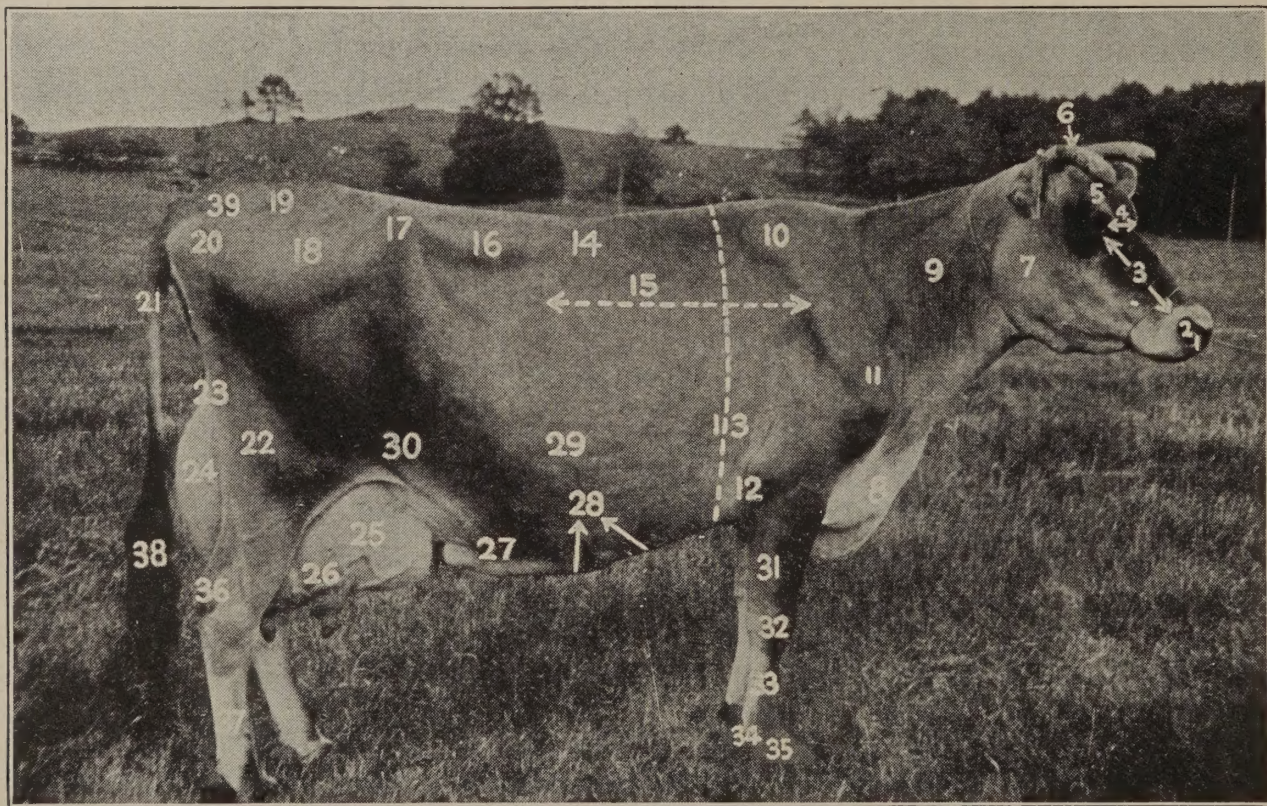


Diagram Showing the Location of the Various Parts of a Cow

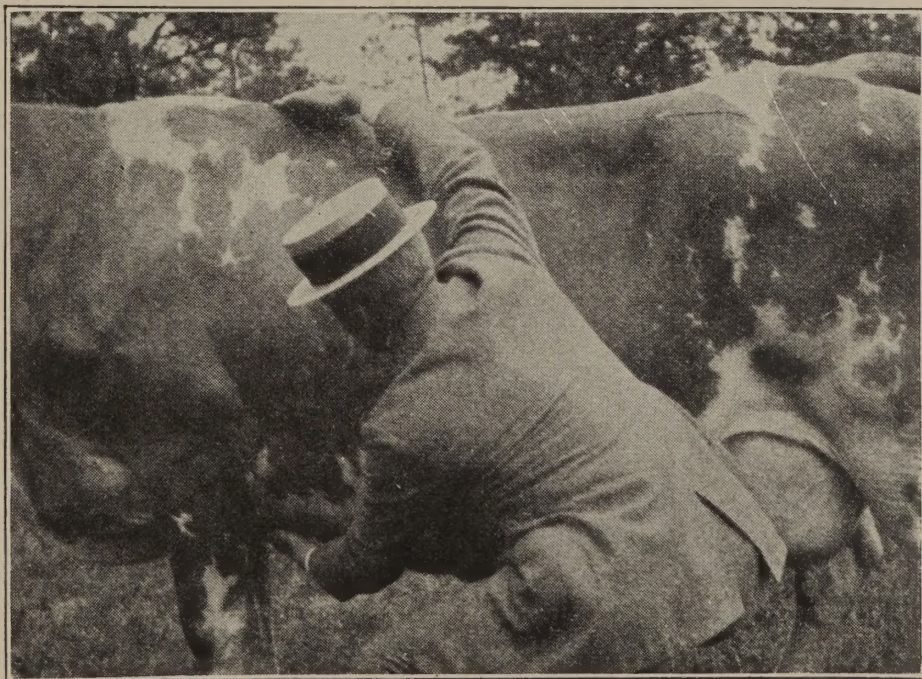
1, mouth and lips; 2, nostril; 1 and 2, combined form muzzle; 3, side of face; 4, width between eyes; 5, forehead; 6, poll; 7, jaw; 8, breast; 9, neck; 10, withers or top of shoulders; 11, shoulder; 12, elbow; 13, depth of chest; 14, back; 15, ribs region of spring of rib; 16, loin; 17, hip points or hooks; 18, hip joint or thurl; 19, pelvic arch; 20, pin bone; 21, tail; 22, thigh; 23, top of twist; region of escutcheon; 24, rear udder; 25, fore udder; 26, sole of udder; 27, milk vein; 28, orifice at end of veins called milk wells; 29, abdomen; 30, flank; 31, forearm; 32, knee; 33, shank; 34, dew claws; 35, hoofs; 36, hock; 37, shin; 38, switch; 39, tail setting.

This all means that the cow must have a well-developed digestive system, an efficient circulatory and vital system—a strong constitution, a sufficient mammary system, and a marked dairy temperament. These are not all the needs of a good cow, but they do represent the things that must be present in every good cow, and if any one of these is lacking in any degree the cow is unavoidably seriously deficient.

Let us discuss these four essentials first.

Capacity Digestive capacity is indicated by a large barrel. If a cow is going to handle a lot of food she must have room for that food. This room is obtained by length of body, width in the rear part of the barrel, and depth throughout. Consequently, a dairy cow must be long from the shoulders to the hips; she must be wide across the top from hip point to hip point, and she must be deep from the rear of the loin to the base of the abdomen. This width at the hooks must be carried well forward—thus giving a wide loin throughout. The loin must be level and not sloping. There is a close relation between the levelness of the loin and the spring of the rear ribs. If the loin be sloping, the rear ribs almost invariably will be found to spring markedly downward, giving a flatness to the ribbing, whereas if the loin be broad and level the rear ribs will spring strongly outward, giving a more rounded shape to the barrel, and a greater capacity. The rear ribs besides springing strongly outward should be broad, flat and wide apart and should have great length, thus giving not only great width of barrel but also great depth.

Constitution A strong constitution is indicated by great chest capacity which demands great depth from top to bottom of the body just back of the forelegs, thickness through the body in this region, width on the floor of the chest and fullness at the elbows. Just as the rear ribs should spring out quite roundly, the fore ribs just back of the shoulder should also spring out quite strongly and descending obtain their greatest width from one-third to one-half way down on the body. Too much narrowness in the region of the crops makes for a smaller chest cavity, which means a lesser heart and lung room and a restricted vital strength. With this strength of fore rib, however, we must avoid a prominence or roughness of shoulder. The shoulder itself must lie smoothly, and the spines of the backbone should extend above the points of the shoulder which should fit in snugly on either side. Any undue prominence of the shoulder indicates a fullness of flesh between the shoulder blade and the front



Showing Proper Depth of Chest

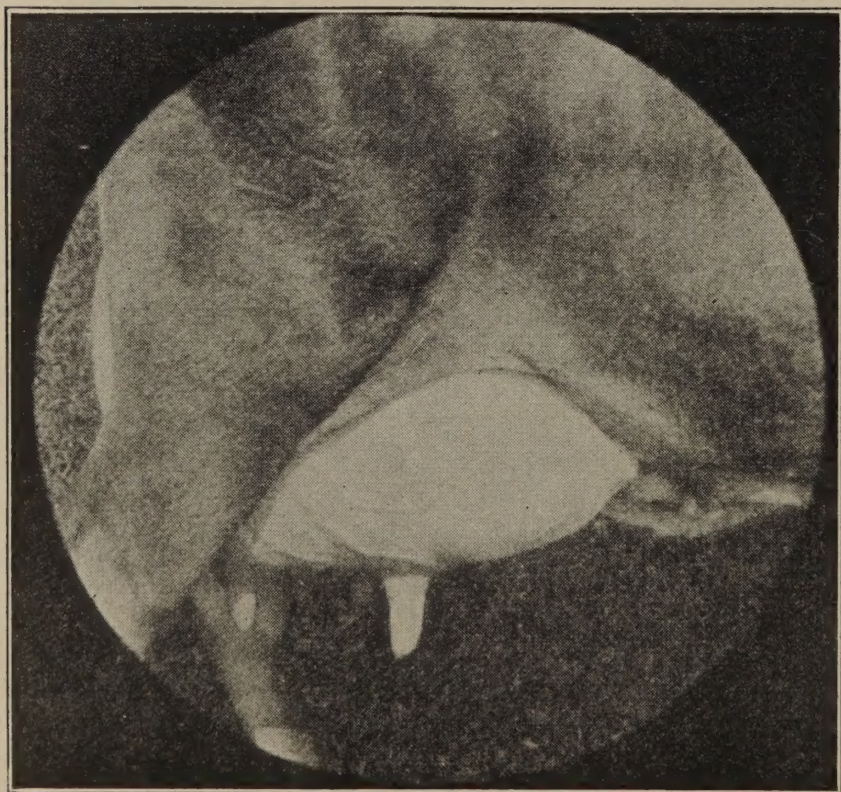
ribs, and this development of flesh is not desired. In dry cows that are well fed preparatory for their next lactation period a breadth across the top of the shoulder naturally develops due to the fat deposited beneath the shoulder blade, so that a discrimination must be made in this matter between dry cows and milking stock. The size of the nostrils are indicative of constitution. A cow breathes only through her nostrils. Large nostrils permit the inward passage of a greater amount of air than do small nostrils, consequently in cows that have a great lung capacity we find the nostrils large, whereas if these intakes are small there is usually found an undeveloped chest capacity.



Large Nostrils are an Absolute Essential

Mammary System To secrete much milk a cow must have a well-developed mammary system. The udder must be large and of the right quality.

Two kinds of tissue enter chiefly into the structure of the udder. These are the alveolar tissue which carries the epithelial cells that secrete the milk; and the fibrous tissue which in a general way serves as the structural



A Well Proportioned Udder

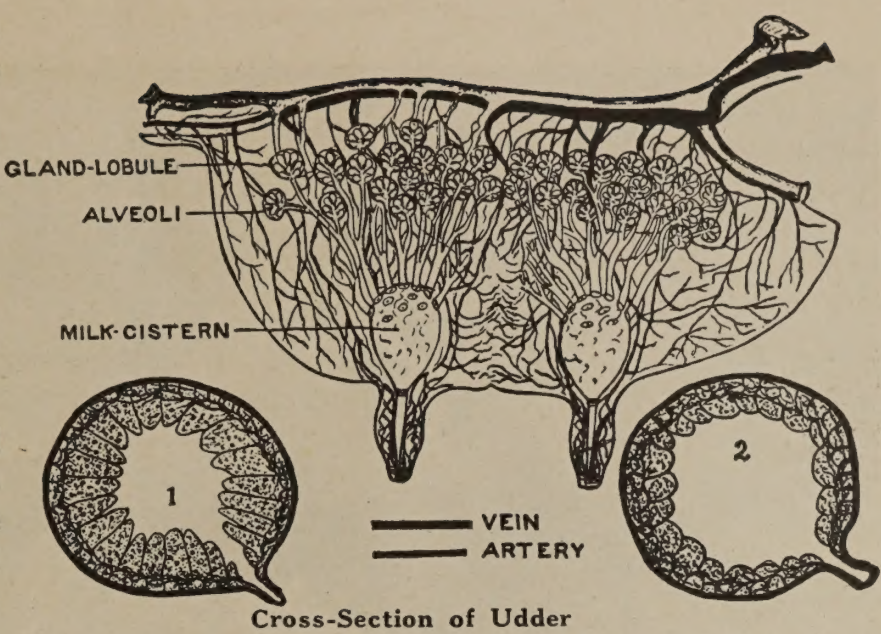
frame which gives shape to the udder, and supports the secreting tissue. This fibrous tissue is strong, inelastic and rather hard. It does not serve in any direct way in milk secretion. As little as possible of this connective fibre tissue is desired in the udder. On the other hand as much as is possible of alveolar tissue is sought, as it consists of milk secreting cells.

Blood Flow Through Udder The blood enters the udder from the rear through large arteries; these divide and subdivide until the blood passes through the capil-

laries which surround the epithelial cells, and passes to the venous capillaries, to be gradually collected into larger veins and carried forward and away from the udder partly in the abdominal veins, which are termed milk-veins.

Udder Structure

A very good idea of the structure of the udder is to be obtained from the accompanying diagram.



Alveolar Tissue

A study of the diagram shows that the alveolar tissue is a mass of hollow globular sacs lined with the milk-secreting epithelial cells. A section of this tissue may be fairly compared to a bunch of grapes, the main stem of which has been hollowed out, the stem of each grape also hollowed out, and the pulp of each grape removed, leaving nothing but the skins intact on the hollowed stems. Such a structure represents the arrangement of the alveolar tissue, and if a layer of single cells were distributed around the entire inside wall of the empty grape skins these cells would represent the epithelial cells. These alveolar cells are elastic. They collapse under pressure and distend when filled.

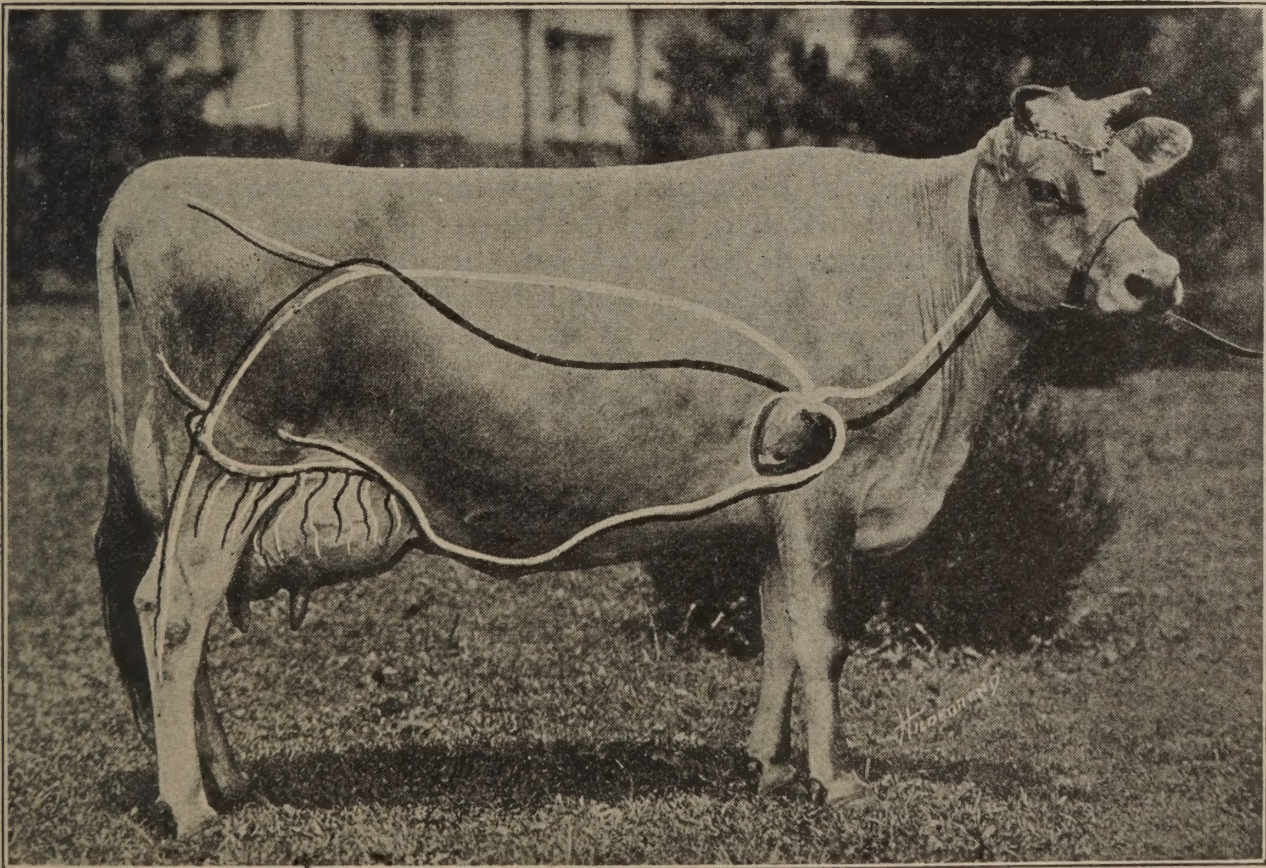
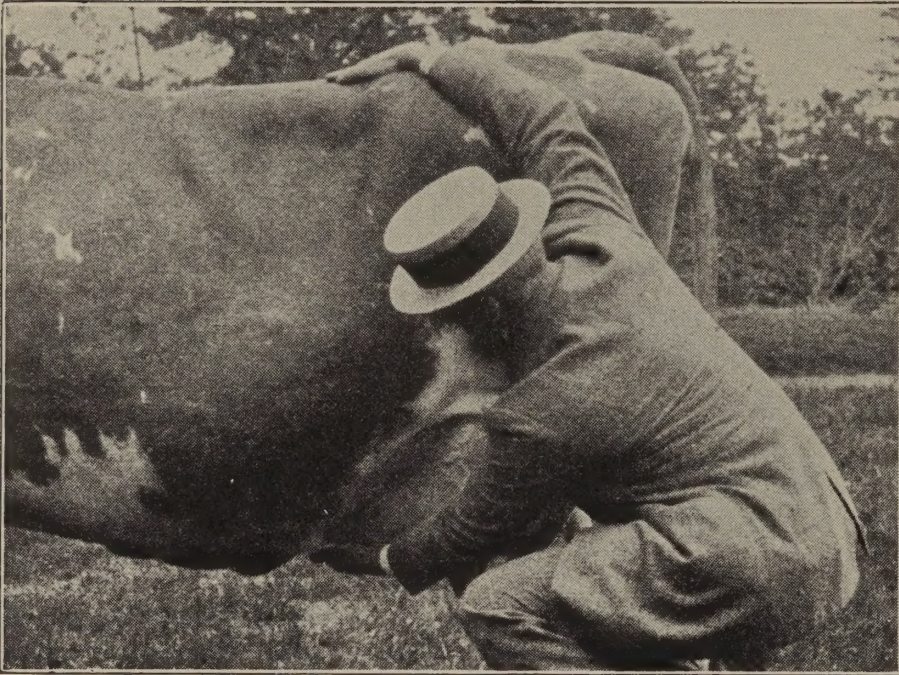


Illustration Shows How Blood is Carried to Udder by Large Arteries (White) and Carried from Udder by Large Veins (Black)



Showing Depth of Flank

Quality of Udder

Evidently the greater the number of these alveolar cells in a cow's udder the greater is her capacity for milk production, consequently the larger the udder, if its size is not due to fibrous tissue, the more desirable it is. But the quality must always be considered with the size. The harder an udder is and the less elastic it is, the greater the amount of undesirable fibrous tissue in

it. If one can see the cow's udder before and after milking one can readily judge accurately of its quality. An udder that milks away well is of good quality; it is elastic and free from all excess fibrous tissue. One can also judge the quality of the udder by pressing it between the hands. If the quality is right the udder is soft, pliable and elastic; but if the udder be coarse, firm and inelastic, it has undesirable quality and is composed largely of coarse fibrous non-secreting tissue. The looseness of the skin in the udder, its fineness, fineness in the hair covering it, and a full veining in the skin of the udder all indicate quality in the udder tissue.

Shape and Attachment

The udder should be long between the rear and forward points of attachment. It should extend high between the thighs; should be broad, well-filled in the rear quarters, deep from top to bottom, well-filled in the fore quarters, broad and level on the sole or bottom and run well forward on the abdomen. The division between right and left halves is always noticeable, but it should not be deep. The division between the front and rear quarters should scarcely be noticeable, if at all, and should never be marked. The right and left halves should be evenly developed. Where one quarter on either side is smaller than its corresponding quarter on the other side it indicates that at some time there has been an affection more or less serious in the shrunken quarter.

Rump

There is a direct correlation between the shape, attachment and carriage of the udder and the conformation of the rump of the cow. The best judges and breeders have always demanded a long rump with the pin bones set high and wide apart, thus giving a very attractive levelness from hooks to pins. Such a rump is particularly pleasing to the eye, and some breeders have rather inclined to the opinion that such a rump, while undoubtedly meeting an aesthetic standard, has no justification from a utility standpoint. In this opinion they are distinctly in error. The length of the attachment of the udder is determined by the length of rump. A short rump necessitates a short udder; a drooping rump naturally is accompanied by an udder that lacks development of fore udder and the whole is tilted. If a cow is narrow at the pins she cannot have as much room in the twist for a highly attached and wide udder. The teats should be large

enough for comfortable hand-milking. Short teats are very objectionable since it is almost impossible to milk them. They are rightly discriminated against most severely by all judges in open rings. Neither is there any advantage in undue length or size. The teat should be regular in shape and of fair thickness.

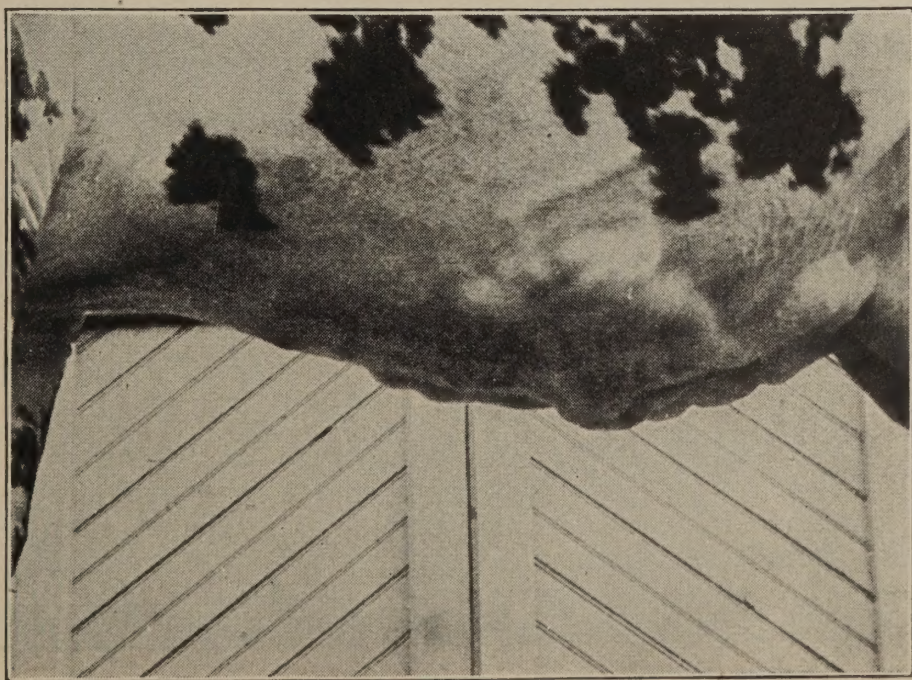
Teats The milk should be easily drawn, yet the muscle at the orifice of the teat should be so strong as never to allow leakage. Frequently there will be found a second opening in the teat; this may be placed close to the main opening at the end of the teat or it may be found on the side of the teat anywhere from the top to the bottom. It sometimes appears as the beginning of an extra teat. Any such formation is undesirable, since it renders sanitary milking impossible; consequently it is severely discriminated against in judging.

The teats should be squarely placed, each teat centrally in regard to the lower surface of that quarter of the udder which it serves.

Milk Veins The milk veins are the large abdominal veins running forward from the udder upon the lower surface of the abdomen. They carry the blood away from the udder but are not the only large veins serving in this capacity. These veins should be large, long, tortuous, branched or netted, and should enter the abdominal wall through large orifices called the milk wells. The size of these veins indicates their carrying capacity. If they are large it indicates that a large flow of blood is passing through the udder and consequently there is the opportunity for a large milk secretion. Care must be taken, however, to observe that the largeness is not due to a varicose condition. The writer has seen cows with milk veins as large as a man's wrist. These were not normal, but the walls of the veins being weak and inelastic they had permanently dilated under the flow of blood passing through them. Elasticity in the vein can be readily observed by pressing it with the finger tips. Aged cows that have passed through several lactation periods yielding large quantities of milk generally show a varicose condition to some extent, consequently, in judging young versus aged cows this tendency must not be overlooked.

Milk Wells The milk wells should be large.

Their size is a true measure of the effective size of the milk vein. If the end of the vein is forked we may have two or even three milk wells on either side. This is desirable.



Showing Large Milk Veins

Escutcheon Frequently the writer is asked concerning the significant value of the escutcheon in the judging of dairy cows. Without going into a discussion of this matter it may be said that the observational work upon which the value of the escutcheon was based has been shown to be erroneous and few careful observers claim that the escutcheon can be considered of serious value in judging. Similarly, the length of the tail bone of the dairy cow can never be of sufficient value to determine the relative placing in a ring, of two cows no matter how nearly alike in all other respects.

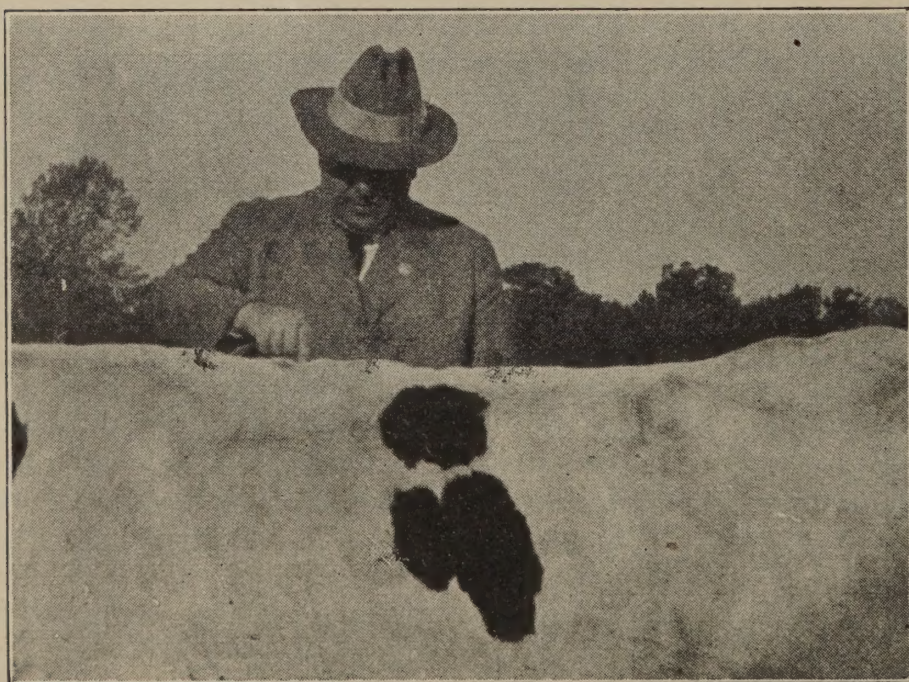
Dairy

Temperament

Dairy temperament is an absolute essential in a dairy cow. In regard to constitution and food capacity the beef and the dairy animal are very much alike. The beef animal is so organized and has the disposition to make flesh. The dairy animal must similarly have not only the equipment but the tendency to make milk. This dairy tendency is indicated in many ways. It is shown by a natural leanness throughout. The head of the dairy animal should be long, especially from the eyes down, and clean cut on the sides of the face. The forehead should be broad, high, and somewhat dished, the eyes full, placid and prominent. The neck should be long and lean. The spine should project above the shoulders at the withers. The chine should be prominent due to a strong development and to a distinct lack of natural flesh over the ribs and along the loin. This lack of natural flesh must be in evidence in every good dairy cow. A fullness of natural flesh and fat is the absolute demand in a meat animal; and it is as absolutely undesirable in a strictly dairy animal. The dairy cow must show everywhere a freedom from meat or meat carrying tendencies, so a light loin, a thin thigh, and an open twist are always sought. Particular emphasis is placed upon the open-jointed character of the back bone. The dorsal processes of the vertebrae should stand out prominently and separately, especially about the middle of the back, making what some men call a serrated skyline. The rear ribs should be broad and flat and widely spaced. One should be able to insert three fingers between the last and second last ribs.

Quality Very Important

In judging dairy cattle, as in all other classes of live stock, quality is a factor of extreme importance. It has two chief aspects, viz: — Quality of Hair and Hide, and Quality of Bone. In the skin a loose, mellow, fairly thin, very pliable and unctuous condition is desired. It should be



The Chine Should be Open

such that one can pick up a handful of skin on the last rib. On the rear of the udder it should also be loose and thin and pliable. There should be no excess at the tongue root or in the dewlap. The hair should be fine, soft and, according to the season of the year, short. It should naturally be bright, oily and have a lively appearance. It should lie close. These characteristics of skin and of hair indicate that there is a full, effective circulation, with a splendid capillary system; they indicate that the secretive glands are functioning well and are enabled to do so because of this excellent circulation. The skin, too, is a sure indication of the efficiency of the digestion of the animal. The lining of the digestive tract is developed from the same embryonic layer as is the outer skin, so it is logical that the condition of the skin covering the body should be and is a reflex of the condition of the digestive tract. A good feeder will detect the beginning of digestive derangement in his cows by the appearance of the eye and the condition of the coat. A heavy skin that lies tightly indicates an excess of fibrous tissue; it is usually accompanied by coarse, harsh hair and these two things are seldom found in a highly efficient dairy cow.

The bone should be smooth, dense and fine. Fine shanks, and shins; fine loins; fineness in the contour of the head; fineness of horn and freedom of grossness in the shoulder, or hooks, and fineness in the tail all are indicative of the correct quality of bone. A cow that is coarse in these parts is almost certain to give lesser returns in milk for the feed consumed.

Size When a cattleman's eyes first fall upon a cow a great many of the before-mentioned points are instinctively more or less accurately summarized. There are, too, a number of other points which immediately make a lasting impression. For want of a better term let these be classed as the points of General Appearance. First of these is the matter of size. Within each breed good size is always demanded and the rather small cow discriminated against. Probably the basic reason amongst practical dairymen for demanding cows of size is that if anything goes wrong with the cows as milkers they can be salvaged at a lesser loss through the meat

market. Undoubtedly there are other good reasons which need not be discussed here.

Lines Every animal should have a straight, strong top line. It adds to the appearance; and beauty helps to find a market for almost everything that is in the market. Particularly, however, is a weakness in the middle of the back or a drooping rump objected to. A cow with a weak back tires more easily, is a



The Rump Should be Long and Level

less active forager and consequently a less useful cow. The faults of the rump have already been noted.

Lowsetness A dairy cow, like a draft horse or beef animal, should be low-set. Lowsetness or its absence is not so much a matter of long or short legs as it is of body depth. The high-set cow has a shallow body and is a slower maturing type that is harder to feed profitably. The lowset cow is lowset because her body is deep and her chest is well let down between her fore-legs.

Style Always a cow should be stylish. She should carry her head erect with grace and alertness. Her carriage in walking should be composed, dignified, active and queenly. Standing she should display these same characteristics and please the observer. To do this a cow must be symmetrical. Her total length must be proportional to her depth and to her width. All parts must be in harmony. The length of neck, body and rump must be proportional. The depth must be properly correlated throughout, i. e., a deep brisket and a light flank would be inharmonious. Symmetry means simply a balanced development between all parts—and in the beautiful cow it is found.

One other factor in style must not be overlooked, i. e., the proper placement of the legs. A cow pleases most when her legs are placed as accurately beneath her as are those of a Clydesdale. That correctness should always be sought.

Disposition In disposition there should always be a placidity about the eye and in the bearing. She should have confidence in her master, should not be easily alarmed, and should not show any viciousness, though these latter traits are usually the result of bad management.

Femininity Intimately associated with the function of milk production is that of reproduction, and upon it the former depends. From a breeding or reproducing standpoint an essential trait of every cow is femininity. The term stands in opposition to that of masculinity as applied to males. Other things being equal, it is the external evidence that the cow is a regular and reliable breeder. It finds expression in the head and neck most. Fineness in the face and the contour of the head, lightness in the horn, fineness in the neck, and lightness in the brisket and shoulder all are attributes of femininity. Docility and gentleness in the expression of the eye and bearing of the animal show this same desirable trait. Frequently heifers will not breed, and often cows at about six or seven years of age go barren and develop characters of the opposite sex. In these undesirable females almost invariably is shown a stag-like character of head and neck, and a heavier, more masculine character of voice. Lack of femininity is a very serious fault in a cow, and should place the animal beyond the consideration of the buyer or judge.

An Essential In the Man The good dairyman loves his cattle. His cows are always in his mind; not because he is obliged to study them, but because he cannot forget them. They are the creatures of his handiwork; by day he works for them; in his leisure he talks of them and at night they fill his dreams. He spends his rainy days not in the horse stables but amongst his cows; he studies them each individually and always.

And to the man who continues to study come new facts, new knowledge, and newer, greater things.

Heifers Not much need be said regarding the judging of dairy heifers. Insofar as they are applicable the requirements in milch cows are sought in heifers. Style, beauty, depth, lowsetness, constitution, dairy temperament, quality, capacity—all have their varying degrees of expression in the calf—and it is astonishing how accurately the character of the mature cow is foreshadowed in the calf.

Regarding the mammary system, adjustments have to be made. In the heifer the boundaries of the udder can be located, and it is desirable to find a good development of udder running well forward, and to find an abundance of loose skin in the udder region. The teats should be of good size, squarely placed, wide apart and flat rather than markedly round. The milk veins should show distinctly and be of good length.

COMMENDATORY LETTER FROM THE OAKS FARM

Cohasset, Mass.

The Quaker Oats Co.,
Chicago, Ill.

Dear Sirs:

In Sugared Schumacher Feed, we believe you have a feed that will prove very profitable to anyone that will give the feed an opportunity to show what it will accomplish.



We have been feeding it now for nearly three months, making it the base of our ration, and regular visitors have remarked the improvement in general conditions of our large herd of pure bred Guernseys, that it has shown in the past month or so. In addition to the general improvement in condition, will say that they have also shown a large increase in milk flow.

Very truly yours,

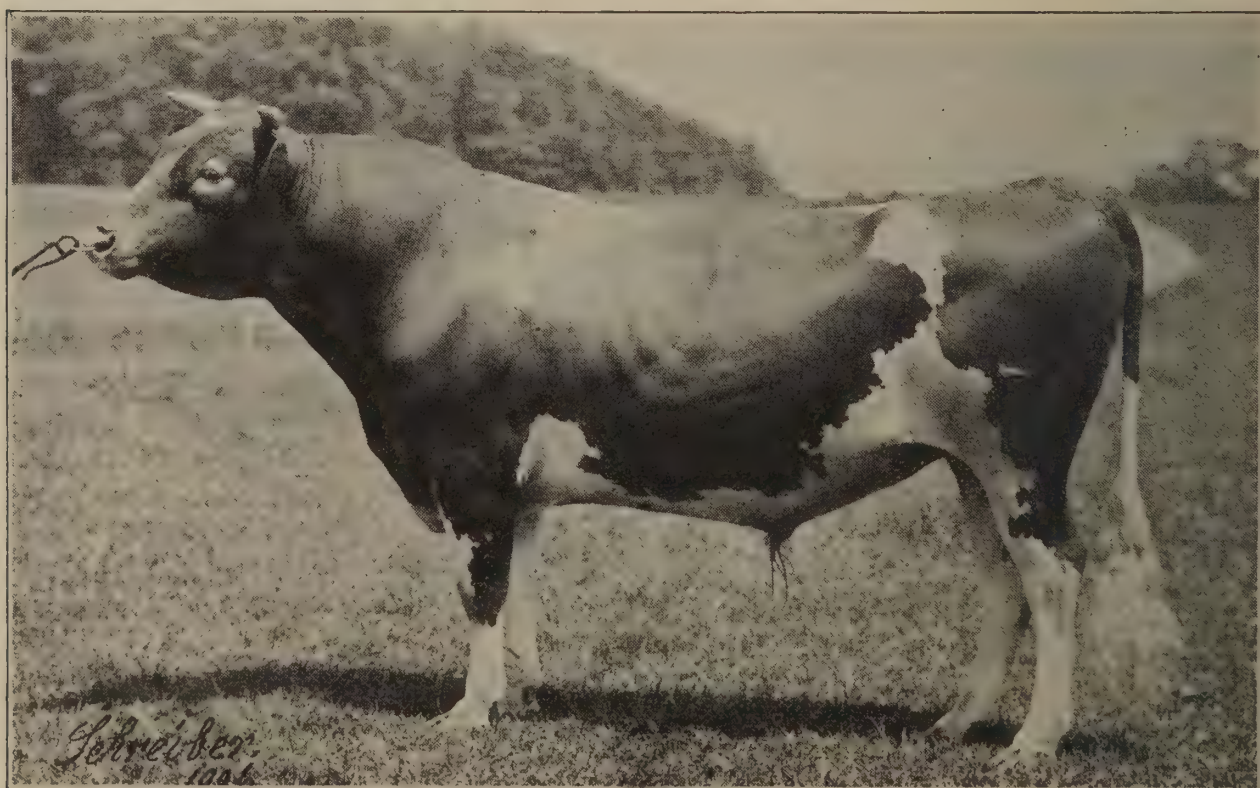
(Signed) W. S. KERR.

The Loin Should be Broad and Level

CHAPTER II

FACTORS IN THE SELECTION OF A SIRE

The Bull of Greatest Importance In the minds of most farmers the chief individual item of expense in connection with the dairy herd is that incurred in the purchase of a sire. As a general rule farmers are not buying females; they raise whatever they may need in this respect; or if they buy they do so with the confidence that the milk of the first year will largely return the money invested. With bulls it is different. Many dairymen feel that there is no direct return from such an investment. In fact they feel and act as if the purchase of a bull were not an investment but rather an unprofitable and permanent tying up of capital, and, consequently, they defer such outlay as long as possible and put as little money as possible into that part of the herd. Thus many endeavor to see how cheap a bull they can get, instead of how good a one. Yet there is no investment that means more in connection with the dairy or the dairy farm, that has a farther reaching influence or is capable of showing greater profits than this very investment. An old saying has it that "The bull is half the herd." This is not all the truth. The bull is the whole herd as far as improvement is concerned. The breeder should always remember that the only way whereby the general average of all the herds of dairy cattle in this country, or any country, can be improved is through the use of better sires. And every State in the United States and every Province in Canada has a great deal to do in the direction of increased production per animal. While undoubtedly our cattle would make a better showing in annual production if more careful methods



Imported King of the May, Langwater Farms, North Easton, Mass.

of feeding were followed, nevertheless most of our animals are just as well fed (or should one say as poorly fed?) as they are bred, and the room and need for more care and attention in the breeding of our animals is very great.

Every Man Has His Ideals

The sire in a dairy herd is a means to an end. That end is the dairyman's ideal concerning his herd. The thoughtful dairyman, studying his herd and its work, gradually evolves an ideal toward which he strives. He observes his herd, its weakness in size, form, production, percentage of butter-fat, color, beauty, style and other factors. Gradually from the observance of these deficiencies there should be evolved a very clear conception of the type of animal which he desires and demands in his herd; in other words, he should form an ideal of the kind of herd towards which he works. If a man fails to form an ideal of some kind, either definitely or indefinitely, it is a certainty that if any improvement occurs in his herd it will be by accident.

To bring his herd to that ideal the owner must depend upon his herd sires. Buying a herd to a type in form and production cannot become general practice. Consequently the bull should be the embodiment of a man's ideals regarding his herd, and is his means of attaining those ideals.

Type What then should be emphasized in the selection of the bull? The things a man wants in his herd. And what should these things be? Every man should insist upon uniform, superior type and profitable production in his herd. The bull should give promise of being able to beget these things. The best evidence of this ability to sire cows that will have uniformity in size, constitution, capacity, quality, and dairy production is the possession of these things. A man should insist on obtaining as many of these desirable individual characters as possible. Poor bulls individually have been known to sire good cows, but they have been and will always be the exceptions. The rule is that "like produces like," and the best single guarantee that a bull will sire attractive progeny is that he be attractive himself.

Production Equally important with desirable type is profitable production, and this generally means large production, not simply for a short time but for the year and for the lifetime of the animal. The ability of a bull to sire cows that are heavy producers can only be judged by a knowledge of his ancestry. His individuality will indicate much but not enough. An animal can only transmit to his progeny what he has received from his ancestry. Time will answer the question "can such a bull sire high producers?" But the answer can be found without wasting time if the farmer will direct the question to the ancestry of the bull rather than to the bull himself. The dam of the bull must be a high producer, or capable of high production. She is the greatest guarantee of ability in this direction. Next to her stands the sire. Has he sired daughters that are high producers, and is he in his turn from a cow that is a high producer? Uniformly high production in the immediate two or three preceding generations, combined with his individuality, is the very best evidence that a bull can produce this thing so much desired.

Always a Pure-Bred

The bull should always be pure-bred. It is against all knowledge gained from the bitter experience of hundreds of dairy-men to use a sire that is not pure-bred. Sometimes, due to financial stringencies, men will save a young bull from a grade cow that individually has many things in her favor, but it is never profitable. The

pure-bred bull of any breed has back of him many generations covering anywhere from twenty-five to over one hundred years of careful selection from the standpoint of type and production. The grade bull at best has the influence of this selection on only one side of his pedigree, and when he is used on other grade stock there is a preponderance of cold, unselected, unknown, unproductive blood and influence. Undoubtedly by traveling over the same road as that taken by our pure breeds and by spending as much time merit could be developed from good grade or common cattle, but it would take more than the full lifetime of any one individual to attain any good result. Consequently, when good pure-bred bulls are as numerous as they are there is no good reason to support a man in the use of grade or scrub sires.

Stick to Your Breed

There is much merit in every breed. There are defects in every breed. Every breed is good but there is no best breed except in the light of a man's own particular conditions. Which breed a man should choose depends upon his climate, his soil, the topography of his land, his market, his inclination and other factors. A man makes a mistake in choosing a breed simply on a vague, indefinite preference; because breeds differ markedly and have their special adaptations. The size, the food requirements, the character of milk and fat and the other various peculiarities of each breed can be readily learned. Having chosen his breed a man usually makes just as serious a mistake by abandoning it for some other breed. As one works with his chosen breed he will discover faults in it. These are best remedied by careful breeding. Changing to another breed simply means adopting a new combination of excellencies and faults, for unluckily—or luckily—there is no perfect breed. This indicates clearly then that a man should continue to use sires of the same breed.

How Much Shall I Pay?

Money is always another factor which enters into the selection of a sire. Quite a few men feel that the prices asked for bulls of the type and breeding which they would like to have are beyond their means. Many of these men have rather a definite opinion that the breeders of pure, registered stock form rather a close trade combination to hold prices



Mount Hermon Aaggie Creamelle. Owner: Mt. Hermon School, Mt. Hermon, Mass.

at an unduly high level. Some men who have followed dairying for a good many years, have acquired by chance or design one or two pure-bred females and have been regular users of pure-bred sires. When these men have a pure-bred bull calf to sell they have difficulty in getting more than thirty or forty dollars for it, yet the sire of this very calf cost them probably one

hundred dollars or more. What is the reason for this difference in valuations, and why should desirable sires be costly? This is a question that frequently recurs. It is well that it does. If every dairyman would turn this question over and study out for himself the answer, there would be fewer of them buying cheap bulls.

Good Bulls Costly Good pure-bred bulls are expensive because relatively they are scarce. There is a small proportion of pure-bred animals in the country. Neither are all our pure-breds superior animals. Some lack individuality. Furthermore many of the cows that are good individuals are in the hands of men who do not prove their production capacity. There is consequently only a limited number of good cows whose ability to produce is proven. The testing of cows, too, is more or less expensive. The proper preparation of the cows for the test, the feeding, regular care and milking, and trouble incident to the care of the official tester, all combine to make an official record an item of considerable expense. These factors and others all combine to make the good individual son of a good-typed proven cow command a considerable price in the open market.

Poor Bulls More Costly But such bulls are the only ones it is advisable to buy. Particularly is this true if one has been using pure-bred sires previously. It costs just as much to keep a poor bull as a good one. The only difference is in original outlay. There is no other place on a farm where one hundred dollars can be so profitably spent than in adding it to the cost price of an unknown sire and thereby securing a sire of assured merit. The wise dairyman who is milking anything over ten cows can easily see that a bull whose ancestry are all high producers of good type is worth infinitely more to him than one concerning the milking ability of whose percentage he knows nothing. He cannot afford to use the latter at all, and he cannot afford to be without the former. The longer a man has used a pure-bred sire the more careful he must be in the selection of new sires. His herd has been gradually improved in both type and production, and greater care has to be exercised if continued improvement is to be attained. After approximately ten years of careful grading up of the herd the owner must be just as careful in the choice of new sires as if his herd were pure bred. For this reason if the farmer has been a careful, studious cattleman it is advisable for him to obtain a few pure-bred females and gradually convert his herd from one of grades to one of pure-breds and thus get a fuller benefit from his careful selection of a herd sire.



Fauvic's Prince. Owner: A. V. Barnes, Lone Tree Farm
New Canaan, Connecticut

Use a Tried Sire

Another reason why good sires are expensive is that we waste them. Too many good sires are put to use at an early age, retained for about two years of service and then sent to the shambles. There has grown up a very general antipathy against the purchase of a mature or aged bull. This is very unfortunate and expensive practice. Bulls are usually good for service until eight or nine years of age, and if sensibly cared for many are reliable breeders until twelve or more years of age. Now if the large proportion of bulls are slaughtered at three years of age and have been used but two years, one can readily see that it requires from three times to five times as many bulls as are really necessary if farmers would conserve their bulls! This is surely astoundingly wasteful practice.

Aside from economy, there are other good arguments in favor of the purchase and use of older bulls. If a bull is three years old he has reached his full size (or nearly so), and consequently one does not have to guess as to what sort of individual he is going to develop into; he stands before one affording a full opportunity to judge of his size, style, type lines, and various physical qualities. His daughters can be seen. These are the evidence of his desirability as a breeder. Thus the guess is almost entirely eliminated. Such a bull should really be worth more than a bull calf or an untried sire. And usually they can be bought for less.

Form and Use a "Bull Ring"

In several sections a co-operative system has been adopted with much success in regard to bulls. An association sometimes called a "bull ring" or a co-operative bull

owners' association is formed which is very simple and works in effect as follows: Four (or more) men who breed the same breed of cattle and each of whom requires the services of a bull, agree each to buy a bull, these bulls to be of equal value. These men A, B, C, D, each use the bull which each buys two years at which time they exchange, D's bull being given to A, A's to B, B's to C, and C's to D. At the end of two more years another shift is made and still again at the end of the sixth year. Thus four bulls meet the needs of four different men for a period of eight years. Each man has had to buy but one bull in that time, whereas acting independently each would have had to buy four bulls. Looked at in another way, each man has had the service of four times as good a bull as he could otherwise afford. The principles of the "bull ring" are so simple, the advantages so many, the difficulties so few, that it deserves the consideration of every community and is bound to become much more widely established than it now is.



Auchenbrain Torreador. Owner: A. Henry Higginson,
Middlesex Meadows Farm, So. Lincoln, Mass.

CHAPTER III

COMPOSITION OF FEEDS

TWO factors determine successful production in dairying. One, the cow we have already discussed. The other, the feeding, care and management, shall occupy the rest of our attention. These two are of equal importance. No man can prosper with poor cows carelessly attended. Poor cows poorly fed are a sure guarantee of failure. Some will make a little profit with poor cows well fed. More will make some profit with good cows poorly fed; but for real success and prosperity we must all do our best to raise good ones, and we rob ourselves if we fail to feed them properly.

First Demand for Food

A cow requires food for three distinct purposes. The first law of life is self-preservation and so the first demand that every cow makes upon its food supply is to keep up its own body. If the food supply of a milking cow is very scant, she will cease giving milk, but she will still live and be in fairly normal condition. This amount of food required to keep the animal's body in normal healthy condition is called the maintenance requirement and is a demand that will always be met. It is equivalent to nearly 10 pounds of grain in the case of a 1000-pound cow.

Second Demand for Food

The second demand upon the feed is for the production of milk. Every part of the milk produced must have its source in the feed box. How great that demand is is readily seen from a study of milk. About 87% of milk is water. The solids in milk (running from under 12% to over 15%) consist of the butter fat, the casein which we all recognize in various cheeses, the milk, sugar and the mineral matter or ash. The butter fat is the most variable solid in milk. Each breed has a different fat content—Jersey milk runs highest in butter fat, Guernseys next, Ayrshires next, and Holsteins take the lowest place of the dairy breeds from a fat content standpoint. Within each breed are high testing and low testing cows. Each cow tests higher just after she has freshened, she then drops to a uniform level for about three months, then the per cent of fat slowly increases until she goes dry. The condition of body and the state of health change the fat. The percentage of the casein (or protein), the sugar and the mineral matter all vary with the fat; they will not vary to as great a degree, but when the fat increases in milk so do the other solids and likewise when it decreases, so the solids, not fat (the casein, the milk sugar and the mineral matter) decrease.

The Cow a Large Producer

An ordinary cow producing only 6,000 pounds of milk in a year with an average test of 3.69% butter fat produces 769 pounds of total edible dry matter in that year. Placing the milk which she produces in a year on one hand and the cow's body on the other if the water be evaporated from both, the dry matter left from the milk will be one-half again as great as that from the cow's entire body.

Third Demand for Food The third demand for food is for the formation of the new forming foetus. To continue to produce profitably year after year a cow must give birth to a calf every year. Its formation and development create a demand especially for mineral and protein matter in the ration.

The needs of the foetus do not create as large a demand as does milk production or the body needs of the cow. Nevertheless, this need is important, and since the cow is producing milk at the same time, unless attention is given to the total protein and mineral needs the supply is likely to be insufficient, resulting in a weak and small calf.

Differing Needs; Different Feeds When only the up-keep of the cow's body is considered, her food can and should be almost entirely of carbohydrate material. In the mature cow very little protein or ash is consumed each day. For milk production much more protein and ash is required, yet even in milk the carbohydrates and fats are more than twice as great in quantity as the protein. So for all the larger purposes of the dairy cow, carbohydrate feeds must be supplied in liberal quantities. These are supplied partially from some of the roughages, but chiefly from the grains such as corn, oats and barley and from the products of these grains.

The dairy cow needs definite kinds of food for definite purposes. It will not do to give her plenty of corn fodder, timothy hay, corn or any other kind of feed just because the owner may have plenty of these things on hand, and expect satisfactory results. A cow can have a full stomach and still actually be hungry, because she is not being given those feeds carrying the ingredients she must have for the work which she is doing.

A man must know his cows, what they must have for their own body needs, what they need for the work they are doing, and then supply these demands from the most economical sources in the market.

Composition of Feed Stuffs All feed stuffs are composed of water, protein, carbohydrates, fats and ash or mineral matter. The body of the dairy cow is composed of the same materials but in different combination and in different proportions.



A Head of Beauty, Refinement, Character and Strength

Water in the Plant

The plant gets its supply from the elements in the air and soil. It builds these up into the various compounds in the different parts of the plant. The animal uses these plant parts to supply it with the necessary protein, etc., from which it builds its body. Water is very important in all plant and animal life. It is the great food carrier. Without plenty of water our crops are a failure. It takes around 300 tons of water to produce one ton of dry matter in our crops. We all know how serious a dry season is or how luxuriant crops are in a wet season. Water forms a large part of every animal's body. It is the great food solvent and all foods are absorbed in solution from the digestive system into the circulatory system. It serves quite largely in disposing of the waste material of the body.

Water in the Animal Body

Water regulates the body temperature, in warm weather large quantities being given off every day by the body as perspiration, thereby keeping the body cool. Liberal supplies of water for all animals are essential and should be available at all times to milch cows.

In summer time cows drink more and a supply of clean, fresh water should be in every field or paddock where stock are. While they drink less in winter, yet it is just as important that water at a drinking temperature be ever before them, and many dairymen agree that the increased production during one season will fully pay for putting in a watering system in the stable.

Protein and Its Sources in Plants

Protein is a term used to name a large number of compounds, all of which contain nitrogen. These nitrogen compounds are not found in large quantities in most plants. They are more plentiful in the growing parts of plants, such as the leaves rather than the stem. They also are plentiful in certain parts of the seed, the germ and the outer-coatings generally carrying a higher percentage of the protein than the rest of the seed. The legume plants—alfalfa, all the clovers, cow peas, beans—are all rich in protein. These plants through the bacteria which grow on their roots have the peculiar ability to take nitrogen from the air and using it directly, thrive upon it and build up stores of protein within themselves. All other plants require protein in order that they may grow and mature into real crops, but this supply of protein or nitrogen must be supplied through some form of fertilizer. Consequently, the legume hays should be grown extensively on every



Sophie Tormentor's Elva. Former Owner: Hood Farm, Lowell, Mass.

farm because, instead of requiring fertilization of the soil with protein material, they will grow on a poorer soil and enrich it; they produce large quantities of protein, rich feeding materials and they carry in generous quantities those desirable mineral products essential for bone building.

The legume hays carry the greatest amount and most valuable part of their protein material in the leaves and more tender stems. In making them into hay and in feeding them, every effort should be made to prevent any waste of the leaves.

Protein in the Animal Body Protein forms a larger proportion of the animal body than it does of plants. Lean meat or muscular tissue is entirely of protein material. The vital organs, likewise, are chiefly proteid material, the white of egg and milk, both carry a large proportion of differing proteid compounds. Greater quantities of protein are needed by young and growing animals; by breeding females and by milking stock of all kinds than is needed by working mature or fattening stock.

The protein in the food performs peculiar and specially important functions. It is essential for body growth in all young animals. It is an important constituent of milk. It must be supplied to repair tissue which through work is constantly wearing out. It is essential to the activity of every cell of the body. A sufficient supply of it in every ration cannot be overlooked without serious consequences.

Carbohydrates and Their Plant Sources Carbohydrates are so named because they are composed of the three elements—Carbon, Hydrogen and Oxygen—in certain proportions. They are abundant in all plants and form the bulk of all crops grown on the farm. There are different groups of carbohydrates, the chief of which are the starches, the sugars and fibre.

Starch Corn Starch, in universal use, is entirely representative of the starch group. Each plant produces its own characteristic starch.



The cereal grains and corn, all produce highly valuable starches, particularly suited to human consumption. The potato and kindred starches produced by tuber plants are generally coarser and less valuable as a human food.

The starches are not soluble in cold water and only slightly in hot water. Boiling changes their physical form and makes them more easily digestible.

Sir Pieterje Ormsby Mercedes 37th. Owner: E. C. Schroeder, Moorhead, Minn.

Sugars The sugars are best represented by our common table sugar. They are readily dissolved in hot or cold water and so are very quickly absorbed from the digestive system into the blood. Though every plant has its characteristic sugar, yet very few plants produce it in abundance, and our chief sources of sugar are the sugar cane, which grows in semi-tropical countries, and the sugar beet. Southern Mississippi, Louisiana, Cuba, the Bermudas and the Hawaiian Islands are the chief sources of cane sugar for the United States. Sugar, because of its palatability, is used almost exclusively as a human food. Only the molasses, from which it is hard to extract the pure sugar is used for cattle feeding.

The sugar beet is essentially a mangel with a high sugar content. It is more delicate and difficult to grow than the ordinary root crops. Sugar beets are, however, very largely grown in Colorado, Utah, California, Michigan and Ontario. They are an expensive crop to produce, and for that reason chiefly, have not interested farmers in many more states.

Fibre Fibre has the same chemical composition as the starches and the sugars, but it has a different form and different characteristics. One kind of fibre is well represented in linen or cotton. It is tough and not readily soluble. It gives strength and rigidity to the plant. It forms the stems, the leaf ribs and the outer coatings of the seeds.

Each plant has its own characteristic fibre which varies in toughness, rigidity and in digestibility. Thus the trunks of trees, the fibre of cotton and the fibre in the alfalfa plant, while all are true fibre and chemically alike, yet they are vastly different from a digestive and food value standpoint. The man who refuses to distinguish for feeding purposes between fibres from different sources, disqualifies himself as a feed authority by his lack of knowledge.

The digestible fibre has the same food value as an equal amount of digestible starch or sugar.

Starches and fibre constitute the greater portion of the plant. The sugar is formed in solution in the sap of the plant; it is the form in which the plant building material is transported while it is stored in the form of starch.

Carbohydrates in Animal Body While these three great carbohydrate groups constitute the very large part of all our farm crops and must form the greater part of all animal food, yet they scarcely exist in the animal body. There is no fibre in the animal body. There is a small amount of animal starch called glycogen in the liver and throughout the muscular tissue. Though this modified starch performs an important function in the body, yet in amount it is insignificant.

Nitrogen Free Extract Explained In feed analyses the carbohydrates are divided into the two groups: Fibre and nitrogen free extract, this latter term including all carbohydrates other than the fibre.

Fats and Oils— Their Sources in Plants

Fats contain the same three elements—Carbon, Hydrogen and Oxygen, as constitute the carbohydrates. They differ in this important respect that they contain less oxygen and so have a food or energy value $2\frac{1}{4}$ times as great as that of the carbohydrates. Fats may be either solid or liquid. Liquid fats are called oils. Fats form a relatively small amount of any of the plants. They are found chiefly in the seeds and more particularly in the germ. Flaxseed, cottonseed and several other seeds running naturally high in fat are used as a source of vegetable oils.

Fats in Animal Body

Fats occur freely in all animal bodies and are quite widely distributed. Fat is the storage form for excess food in the animal body. It is more freely deposited just beneath the skin, around the kidneys and the viscera, and to a limited extent between the muscle fibres.

Mineral Matter or Ash

Mineral matter is also called ash. The mineral matter in plants consists chiefly of Calcium Potassium Phosphorus, Sodium Iron Magnesium. The mineral matter runs low in most seeds. It occurs in the coarser parts of the plant and in the outer seed coatings. Milling processes frequently result in giving by-products that are quite high in ash. Of all farm crops corn is poorest in mineral matter. The grasses and grass hays carry considerable silicon which has no food value; they are rather low in useful ash. The clovers and alfalfas as all run high, particularly in calcium; small white clover is particularly rich in phosphorus, which makes it an unexcelled pasture for young stock and milking cows. Root crops and particularly the leaves of root crops carry a high percentage of sodium and potash, which makes them laxative when freely fed any kind of stock.

Calcium and phosphorus constitute the larger proportion of minerals in the animal body. From 6 to 9% of the animal body is mineral matter being about 70% of the bony skeleton. Iron is an essential constituent of the blood. Small amounts of the other minerals are found in different parts of the body, serving important purposes, but Calcium and Phosphorus are the only ones required in such large amounts that the ration must be studied to ensure a supply of them. If, however, good clover or alfalfa forms the chief source of roughage and a mixture of grains forms the concentrate part of the ration, additional mineral matter is not needed.*

*See Bulletins No. 295, 308, 330, 347, Ohio Experimental Station, Wooster, Ohio; Bulletin No. 945 U. S. D. A. Dairy Division, Washington, D. C.

THE MIXTER FARM

The Quaker Oats Co.,
Chicago, Ill.

Hardwick, Mass.

Gentlemen:

You may be interested to know that we have been feeding Sugared Schumacher for some time.

We use this grain as a source of carbohydrates for our milking herd and for our test cows. We are also feeding Sugared Schumacher Feed with Oats to our working horses.

This grain is proving satisfactory. Our cows like it and both their condition and production are very gratifying.

Very truly yours,

J. S. CLARK, Mgr.

CHAPTER IV

THE FUNCTIONS AND SOURCES OF OUR FEED SUPPLY

AN ANIMAL uses its food:

- (1) To maintain its life. To keep up the vital processes.
- (2) To repair tissue being destroyed constantly by every vital activity.
- (3) To build new tissue. This occurs only in young, growing, immature animals. Once an animal has reached maturity, further growth is impossible.
- (4) To produce fat.
- (5) To produce bodily products such as milk.
- (6) To maintain body heat.
- (7) To do work.

The carbohydrates are used to supply heat; to furnish energy for work; to produce fat in the body, and to produce the sugar and the fat in milk.

The fats can and do serve exactly the same functions as do the carbohydrates. Horses, cattle and sheep can only use small quantities of fat in their ration. Because the fats are such a small part of all feeds and because they are usable only in small quantities they form an unimportant part of the dairy cow's ration. While they should not be overlooked they cannot be emphasized.

The proteins can serve all the functions that the carbohydrates do; thus they may serve as sources of fat, heat or energy. But the proteins are nitrogen compounds and are particularly valuable and always expensive because they are exclusive nitrogen carriers. When a protein compound is used to build fat or sugar in milk or in the body, the nitrogen, which is its costliest part, passes from the body in the excreta. As a source of energy the proteins are as efficient as the carbohydrates, but to use them as sources of energy or heat is no more justifiable than would be the burning of mahogany wood in place of coal in our furnaces. The mahogany might be



Spring Brook Bess Burke. Owner: E. C. Schroeder
Moorhead, Minn.

an effective heat producer, but it would be very costly. So is the burning of protein feeds to produce heat energy or fats.

The special functions of proteins are:

- (1) To build new tissue.
- (2) To repair waste tissue.
- (3) To maintain all vital processes. Every cell requires certain protein compounds.
- (4) To furnish the casein and albumen in milk, eggs, etc.

Thus we see that protein foods are especially required in all growing animals and by dairy cows.

The mineral matter is especially needed for the building and maintenance of the bony skeleton. Lime and phosphorus are essential constituents of milk. If not supplied in the food, the cow will extract these minerals from her body in order to keep up the milk flow. Iron is an essential of the blood and sodium and potassium are found in small quantities in the muscles. There are no substitutes for mineral matter and if they are not supplied, ill health, or dwarfed, stunted or distorted development follows.

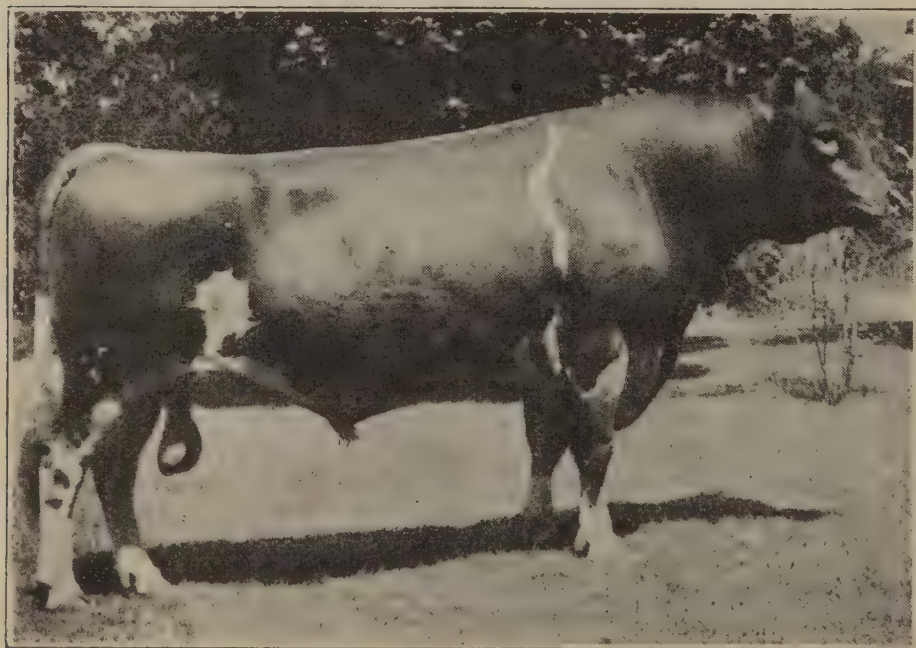
Chief Sources of Protein Alfalfa, lespedeza, the clovers, the vetches, cow peas and soy beans are the principal farm sources of protein. They are all good, each in its various locality. Every argument is in favor of their production on every farm to the greatest degree possible. There are no grains high in protein; the by-products, linseed meal, cottonseed meal, gluten feed, distillers grains, brewers grains and bran are the large regular sources of protein outside of that produced on the farm.

Cottonseed meal is the richest in protein. It varies greatly, the highest grade carrying 44% total protein. It is not particularly palatable, though cows soon overcome any dislike of it. It is noticeably constipating. Though it has been fed for some time without apparent ill effect, at the rate of 6 pounds per day, care must be exercised in compounding the ration if a cow is to be continually fed more than 2 pounds of cottonseed meal daily. Many

good breeders and feeders have a conviction that cottonseed meal feeding interferes with regular breeding.

Linseed oil meal is very palatable. It is exceeded in protein content only by cottonseed meal. It carries considerable oil and is slightly laxative. It has no harmful influence and may safely be fed in any reasonable quantities.

Distillers grains are a bulky rich feed, carrying in addition



Itchen May King. Owner: G. Kingston & Son,
Muskego Lake Farm, Waukesha, Wis.

to a high protein content, a high fat percentage. They are deficient in mineral. They are usually very palatable, but on account of the fat are likely to develop rancidity in warm weather. Corn distillers grains are much higher in protein and in total value than are the rye grains.

Brewers grains carry a medium amount of protein and give somewhat better results than wheat bran for milk production. They, however, lack the desirable mineral content of bran. They are bulky, but not very palatable.

Wheat bran, though relatively low in protein, is a particularly desirable dairy feed because it runs high in phosphorus. It is bulky, palatable, and slightly laxative.

Gluten feed is a by-product in the manufacture of corn starch. It is rich in protein, fair in carbohydrates and low in ash. It is readily digestible, somewhat heavy, palatable and quite uniform. It has no deleterious effect and so makes a desirable feeding material.

Sources of Carbohydrates The main bulky carbohydrate feeds are the grass hays, field corn, corn stover, silage, root crops and their by-products, and the various kinds of straw.

The concentrated carbohydrate feeds are wheat, corn, oats, barley, rye and buckwheat in their various forms. There are a goodly number of feeds of minor importance, the discussion of which will be of little practical value and so they will be omitted.

In contrast to the legume hays, the grass hays are all lower in protein, lower in valuable mineral matter, and relatively much higher in carbohydrates. Timothy hay is the commonest example of this class and it is the most widely grown. Very often with it is grown a mixture of the finer grasses. It carries a considerable portion of fibre which requires a greater energy of digestion and, consequently, yields a lower per cent of net energy for the work of the animal.

The more nearly ripe the hay crop is the greater the total amount of carbohydrates in it and the total amount of fibre. The older the plant gets, the tougher the fibre becomes, and the coarser or larger the plant, generally the greater amount of fibre in it. Men who grow their own hay should endeavor to get a thick stand, use the finer grasses and harvest the hay crop before it begins to ripen.

The straws carry more fibre than the hays and are of less feeding value. Timothy hay is very widely grown and used as a horse feed, because it is easily grown, easily harvested, easily graded and generally is free from dust. It is not nearly as desirable for cows, however, as are the finer hays. However, for cows, and all young stock, every man should endeavor to grow an abundant supply of the clover or legume hays.

Johnson Grass is the chief source of hay in the southern states. It is a rapid growing, heavy yielding plant. If cut shortly after heading, it makes a palatable hay, but as it gets older it becomes too coarse and fibrous to be even palatable. In feeding value, it is equivalent to timothy hay of the same grade.

Cottonseed hulls are quite widely used throughout the south, as a source of roughage and as a carrier for cottonseed meal.

The chief merits of the hulls are that they serve as a bulky filler, and, mixed with the meal, they so distribute it as to avoid digestive trouble. As a source of nourishment the hulls cannot be highly recommended. They

should be used sparingly if at all, and the bulky part of the ration should consist of some legume hay and silage.

Corn fodder or corn stover is still much less desirable as a feed for dairy cattle because of its coarse and fibrous nature.

Corn silage and the root crops, besides being bulky carbohydrate feeds, are particularly valuable because of their high water content, or succulence. For winter feeding of dairy cattle of all ages and stages, a considerable amount of either silage or roots is particularly desirable. Apparently all ruminants require succulent feed. In summertime pasturage supplies most of the ration in a green food, but in winter succulence can and should be supplied by either of the above feeds. No good dairyman ever fed either one of these succulent feeds throughout the winter without being convinced that the man who tries to make milk or produce cattle without them works at a disadvantage.

Turnips have a higher feeding value than mangels and their regular use is reflected in the health of the animals as well as in the milk flow. Cabbage is also a very excellent milk producer. Both turnips and cabbage distinctly flavor the milk and must be fed just after milking to avoid this effect.

Silage has a rather penetrating odor and like roots should be fed after milking rather than before.

There are a variety of crops usable as silage. In corn growing sections, corn will always be the desirable silage crop. Sunflower is proving a very desirable and profitable silage crop beyond the natural heavy yielding corn areas. Sunflower has a wider range of adaptation than corn; it produces heavy yields in areas where squaw corn is the only corn that can be grown; and it has been proven in so many areas that its extended use is certain.

Corn, oats and barley are the chief **whole** grain carbohydrates. Corn is the richest in carbohydrates, but is deficient in protein and conspicuously low in mineral matter. Corn generally carries quite a percentage of moisture and unless previously kiln dried, frequently spoils in storage or transit in warm weather.

Barley carries more protein, more mineral matter and rather more fibre than corn; as a source of carbohydrates alone it is not quite so valuable as corn, but is a desirable portion of a ration as it has distinct advantages over corn especially for breeding animals—and all dairy cattle are breeding stock—for young growing animals for the milking herd and for fitting purposes.

Oats carry rather more fibre than barley, a greater per cent of protein, of mineral matter and of fats. Oats are highly palatable and have always been regarded as a particularly desirable feed for all classes of stock. Oats are generally clean, free from dust or smut, less liable to spoil in storage and so make a very safe feed. Their fibre content secures a more complete mastication. There is no grain feed that reduces digestive troubles to a greater extent than does oats. Their recognized value and wide use as a human food and their desirability as a part of the grain ration of horses, mules and all classes of stock everywhere, have largely influenced the market value of this desirable carbohydrate.

Corn, oats, and barley should each be ground before being fed to cattle. Crushing is insufficient. When whole grains are fed, a large percentage passes through the animal undigested. With all good dairymen, all grains fed are ground for economy's sake.

Growing out of the manufacture of the various grains for human food or to meet other needs of mankind there are many very valuable carbohydrate by-products resulting.

Hominy feed is a by-product in the making of hominy grits or of cornmeal. It is a bulkier feed than straight ground corn. It carries less water, rather less carbohydrates, but a higher fat content that makes it fully equal the value of corn. It is kiln dried and so more uniform in content and of better keeping quality in warmer weather.

Schumacher Feed is a mixed feed produced essentially from the products resulting in the milling of corn, oats, wheat, and barley. This feed had its beginning from the oatmeal industry. From earliest times stockmen, without being able to give the definite reasons, have universally agreed that oats have a peculiar feeding value beyond what is represented in their chemical analysis. Of late the feeding work of Dr. McCollum of Johns Hopkins University has found the true reason for this high oat value to be due to the high vitamine content of oats that makes them undoubtedly of greater feeding value than any other whole cereal.

The makers of **Schumacher Feed** are makers of rolled oats, pearled barley, of table cornmeal and of wheat flour. Man requires only certain parts of most cereal grains in his food. From each of them most excellent parts are eliminated as being undesirable for man; in making table cornmeal, hominy feed results; from pearling barley, barley middlings; from rolled oats, oat feed; from wheat flour, various products, amongst them being red dog flour. These products are of varying values, but each has real value and a distinct place and use as a feed.

From these, with other slight additions, millers have built the equivalent of an excellent oat. The result of this effort is **Schumacher Feed**. In composition **Schumacher Feed** has slightly less fibre and a slightly higher total digestible value than oats. It is kiln-dried and finely ground. It has a distinct advantage over oats; in that it is composed of different ingredients, thus in itself is a feed possessing variety. Being kiln-dried it keeps well in storage or transit.

Built upon **Schumacher Feed** is **Sugared Schumacher Feed**, which is **Schumacher Feed** plus molasses, added by a special process whereby the **Sugared Schumacher Feed** is as clean, dry, and pleasant to handle as any ground grain. This feed is further described in chapter seven.

It is an unequalled carbohydrate feed that quickly establishes itself with the herd and the dairyman.

From barley come malt sprouts, brewers grains, both wet and dry, and barley feed. Malt sprouts are not palatable, are very fine and inclined to be dusty. They are, therefore, seldom offered as such for feeding purposes though their food value runs high. Wet brewers grains can only be fed at or near the brewery. Unless great care is taken, they will, like silage, flavor the milk. The dried grains are bulky, palatable, low in ash, fairly high in protein and of medium carbohydrate content.

Barley feed is largely the result of the making of pearled barley for human consumption. It is composed of the barley bran, which is the outer coat, and the fine floury middlings that are ground off in the pearling process. The barley middlings are too fine to be usable by themselves, so the bran and middlings are mixed to form barley feed, a palatable, digestible, nutritious uniform product.

Oats are milled largely for making oat groats, oatmeal and rolled oats. From them come oat hulls, oat middlings and oat shorts. In the process of oatmeal manufacturing a percentage of broken oats are discarded. The hulls are largely carbohydrate, bulky and quite high in fibre. The fibre of oat hulls is 60 per cent digestible according to the best authorities. The oat hulls arising from oatmeal manufacture are markedly increased in digestibility by the process of heating which they undergo. No other fibre occurs naturally or otherwise in live stock feeds that even approximates in feeding value that arising from the oat hull from oatmeal manufacture. The oat middlings is a very fine product removed after the hull. It has high feeding value, but is too fine to be a desirable feed by itself. Oat shorts are the outer coats of the oat groat or kernel. They are a valuable feed, fairly high in protein and fat, and of good carbohydrate value.

The above mentioned materials constitute oat feed. Oat feed is consequently fairly bulky, carries a goodly percentage of carbohydrates, which are quite highly digestible and is low in protein or fats. Oat feed is usually combined with other highly concentrated feeds before being offered to the public. It adds bulk, palatability, and much of the peculiar feeding value that has always been recognized as characteristic of oats.

APPLETREE POINT FARMS

The Quaker Oats Co.,
Chicago, Ill.
Gentlemen:

Burlington, Vermont.

We have been using considerable Sugared Schumacher Feed this past fall for feeding our young stock and dry cows; it has been extremely satisfactory and the cattle have kept in splendid shape, the youngsters having all made good growth the past few months. This feed is very much liked by our stock and with their endorsement, naturally ours goes along with it.

Very truly yours,

U. A. WOODBURY, II.

BURNSIDE STOCK FARM R. R. Ness & Sons, Props.

Howick, Que.

The Quaker Oats Co.,
Peterborough, Ont.
Dear Sirs:

We have been using Schumacher Feed for a number of years and consider it the safest Dairy Cattle and Horse Feed we can get. Results with it have been excellent with us.

Yours sincerely,

R. R. NESS & SONS,
Per R. R. Ness.

CHAPTER V

REQUIREMENTS OF A GOOD RATION

A SATISFACTORY ration for a dairy cow should be:

Palatable	Balanced
Digestible	Bulky
Varied	Succulent
Profitable	

Palatable—No matter how completely a ration may meet all the other needed points, unless it appeals to the palate of the cow she will not eat it, or will eat it with aversion. When a ration pleases, more of it is eaten, the digestion is more complete, and the production more profitable.

Digestible—One should study the digestible contents of all feeds one usually uses. All the feed consumed is not digested. There is always a portion thrown off in the feces. The amount thrown off varies with the different feeds; with the high fibre feeds, like wheat, straw, or ripe timothy hay there is a large part undigested. When all the constituents of a ration are computed, better than two-thirds should be digested. When the suggestions regarding feeding as made in this book are followed there will not be any excess of waste material.

Varied—It is necessary to draw a cow's feed from a number of different sources. Variety gives a more complete digestion, better health and greater production. The wider the variety, the more pleasing the results. The variety must not be secured by giving a different ration every week or every month, but must be secured by arriving at the best possible mixture and using it regularly. The dairy cow objects to any sudden change in her ration and will show her resentment by a lessened milk flow.

Balanced—As previously pointed out, a cow requires different food elements for varying needs. She must have protein, carbohydrates, fats, and mineral matter to keep her alive, to build her body, to repair waste tissue, to produce milk, and to produce offspring. Just giving her a lot of feed will not do; she must have the different constituents to meet all needs or eventually she will be limited to her ability to produce.

Bulky—Every man knows that cows must have bulky feed. They are specially built to handle bulky food, and as much bulk as is profitable should always be in the ration.

Succulent—Dairy cattle of all ages and stages appreciate a watery feed. The full explanation has not been arrived at, but it is a fact that succulence in the ration gives desirable results that are not attained in any other way.

Profitable—Dairying is a business. Every man who keeps cows must figure his cost or fail to know the real state of his operations. Feed costs are the largest single item in dairying. They represent the largest opportunity for making profits or losses. Every man should know his feeds, follow the market, know his cows, and feed with one eye on the milk pail and the other on the feed costs.

The maintenance requirement of the dairy cow has been carefully worked out in many feeding trials. It is here summarized.

For maintenance	Digestible Protein Pounds	Total Pounds Digestible Nutrients
A 900 lb. cow requires.....	0.63	7.1
A 1000 lb. cow requires.....	0.7	7.9
A 1100 lb. cow requires.....	0.77	8.7
A 1200 lb. co wrequires.....	0.84	9.5
A 1300 lb. cow requires.....	0.91	10.3

With just as great care and by many professors at different colleges and experiment stations, the amounts of feed needed to produce different amounts of milk containing different percents of fat have been determined.

The following table gives the amounts of nutrients needed for production:

25 lbs. milk testing 3.5 %	require 1.2 lbs. Dig. Prot. and	7.9 lbs. total Dig. Nut.
30 " " " 3.5 %	" 1.5 " " " " "	9.4 " " " "
35 " " " 3.5 %	" 1.7 " " " " "	11.0 " " " "
40 " " " 3.5 %	" 2.0 " " " " "	12.5 " " " "
45 " " " 3.5 %	" 2.2 " " " " "	14.1 " " " "
20 " " " 4 %	" 1.1 " " " " "	6.9 " " " "
25 " " " 4 %	" 1.4 " " " " "	8.6 " " " "
30 " " " 4 %	" 1.6 " " " " "	10.3 " " " "
35 " " " 4 %	" 1.9 " " " " "	12.0 " " " "
40 " " " 4 %	" 2.2 " " " " "	13.7 " " " "
20 " " " 4.5 %	" 1.1 " " " " "	7.5 " " " "
25 " " " 4.5 %	" 1.4 " " " " "	9.3 " " " "
30 " " " 4.5 %	" 1.7 " " " " "	11.1 " " " "
35 " " " 4.5 %	" 2.0 " " " " "	13.0 " " " "
20 " " " 5 %	" 1.2 " " " " "	7.9 " " " "
25 " " " 5 %	" 1.4 " " " " "	9.7 " " " "
30 " " " 5 %	" 1.8 " " " " "	11.8 " " " "
35 " " " 5 %	" 2.1 " " " " "	13.8 " " " "
40 " " " 5 %	" 2.4 " " " " "	15.8 " " " "
20 " " " 5.5 %	" 1.3 " " " " "	8.5 " " " "
25 " " " 5.5 %	" 1.6 " " " " "	10.6 " " " "
30 " " " 5.5 %	" 1.92 " " " " "	12.7 " " " "
35 " " " 5.5 %	" 2.24 " " " " "	14.8 " " " "
40 " " " 5.5 %	" 2.56 " " " " "	16.9 " " " "

From these two tables one can very readily compute very closely what each cow in his herd requires by combining the needs for maintenance and production. All he needs to know is the weight of his cow, the number of pounds of milk she is giving and its butter fat test. If he has not the test one can with reliance estimate Jerseys at 5 % or better, Guernseys at from 4.5 % to 5.5 %, Ayrshires at about 4 % and Holsteins at 3.5 %. But in some way arrange to have a test and eliminate guessing.

Knowing just about what the cow needs for the work she is doing, one must then select a ration for her that will meet her food requirements and will also fulfill the other important factors of a good ration.

The following table gives the amount of digestible protein and the total digestible nutrients in the common feeds in the market:

In 100 Pounds	Pounds Dig. Protein	Pounds Total Dig. Nutrients
Low Protein—High Total Nutrients Group		
Corn	7.6	85.0
Wheat	9.2	80.0
Barley	9.0	79.4
Oats	9.7	70.4
Schumacher Feed*	8.6	75.0
Sugared Schumacher Feed*	8.9	77.0
Hominy Feed	7.0	84.6
High Protein Group		
Linseed Oil Meal (Old Process)	30.2	77.9
Cottonseed Meal—Choice	37.0	78.2
Cottonseed Meal—Good	31.6	74.8
Distillers Grains, Corn	22.4	88.9
Gluten Feed	21.6	80.7
Gluten Meal (High Grade).....	30.2	84.0
Medium Protein Group		
Red Dog Flour.....	14.8	79.2
Wheat Middlings	13.4	69.3
Wheat Bran	12.5	60.9
Roughages—Dry		
Clover Hay	7.6	50.9
Timothy Hay	3.0	48.5
Alfalfa Hay	10.6	51.6
Oat Straw	1.0	45.6
Oat Hay	4.5	46.4
Corn Fodder	3.0	53.7
Lespedeza Hay	8.6	52.2
Succulent Bulky Group		
Corn Silage	1.1	17.7
Corn Silage, immature	1.0	13.3
Turnips	1.0	7.4
Mangels	0.8	7.4
Pasture Grass	2.5	13.7
Miscellaneous		
Whole Milk	3.3	17.9
Skim Milk	3.6	9.1
Buttermilk	3.4	8.4

*Based on average analysis.

To illustrate the value and convenience of the above tables, let us assume the case of a 1000-pound cow giving 30 pounds of 5% milk. Her needs are:

	Pounds Dig. Protein	Pounds Total Dig. Nutrients
For maintenance	0.7	7.9
For production	1.8	11.8
TOTAL	2.5	19.7

WARE SHOALS FARM

(Department of Ware Shoals Mfg. Co.)
Ware Shoals, S. C.

The Quaker Oats Co.,
Chicago, Ill.

Gentlemen:

We have been using Schumacher Feed for several years and have always been more than satisfied with your product.

Our last two cars have been Sugared Schumacher Feed, and from this we have had most wonderful results.

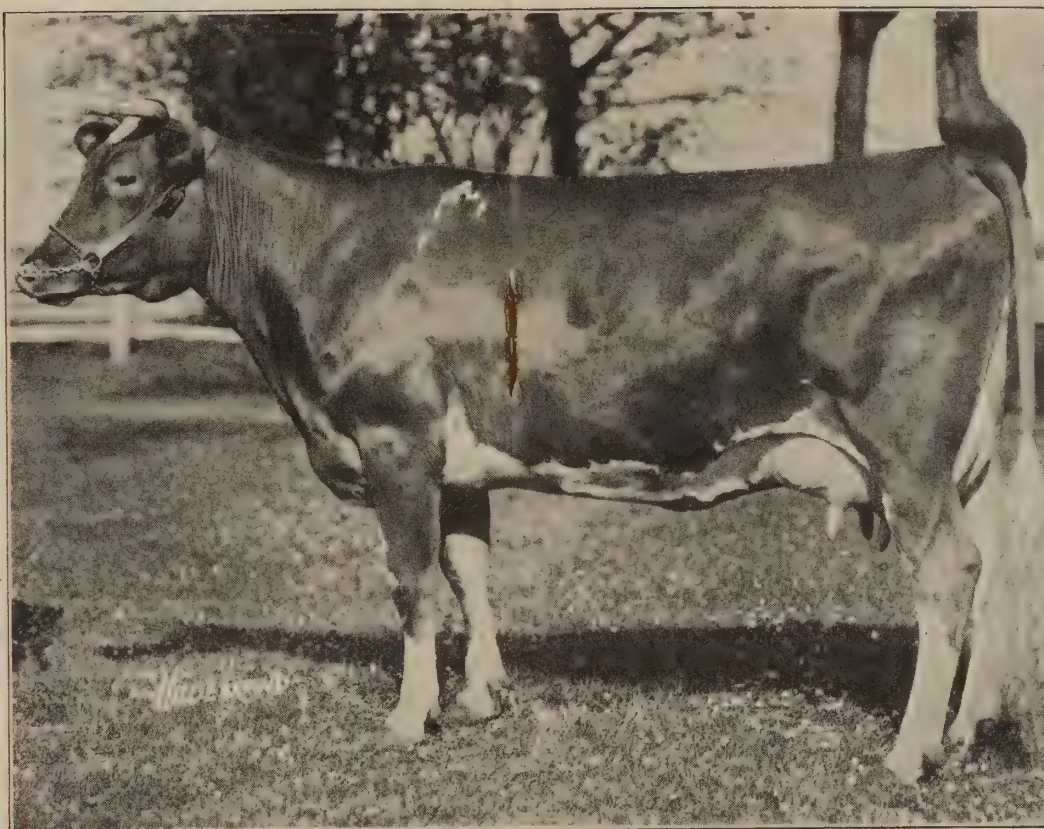
We have a herd of 65 head registered Guernsey Cattle, and every animal over two weeks old is receiving Schumacher Feed in some way or other.

Our main herd is fed Schumacher Feed and Cotton Seed Meal; young stock get a ration of Schumacher Feed and Corn with a small amount of Oil Meal and the calves are fed Schumacher Feed and Bran equal parts.

Our test cow ration always contains Schumacher Feed.

You may be assured that we will always feed Sugared Schumacher Feed to our Guernseys or at least we will do so until we can produce as good a feed for less money at home.

Yours very truly,
ANDREAS WESTERGAARD,
Supt.



Brookmead's Dorothy. Owner: F. Graham Thomson, Brookmead Farm, Devon, Pa.

PENSHURST FARM

The Quaker Oats Co.,
1600 Railway Exchange,
Chicago, Ill.

Narberth, Pa.

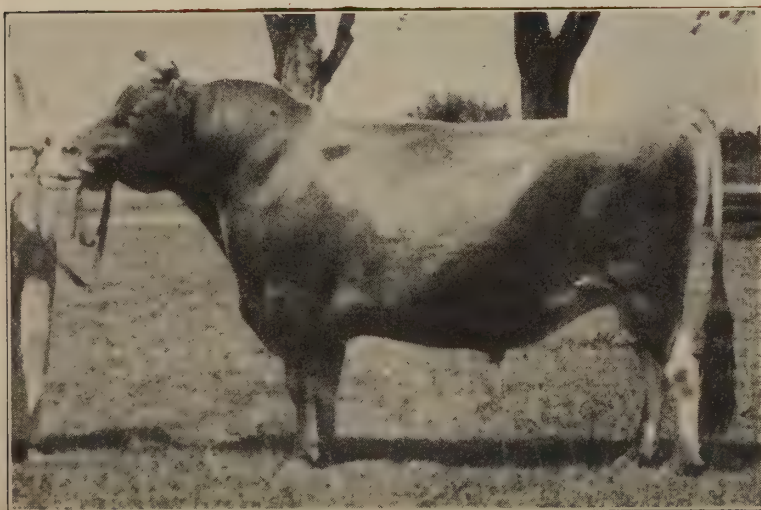
Dear Sirs:

We have fed Schumacher for over ten years to our cows with uniformly good results. I have always found Schumacher Feed in good condition, sweet, palatable, relished by the cows and to be the best feed of this kind that I am familiar with. We have fed it to all of our world's record cows, including Garclaugh May Mischief, the world's champion Ayrshire cow, record 25,328 lbs. milk, 1,053 lbs. butter; Bloomer's Queen, world's champion four-year-old, record 21,820 lbs. of milk, 1,007 lbs. butter; Auchenbrain Gem, world's champion Roll of Honor cow, record 16,418 lbs. milk, 788 lbs. butter, and Penshurst Nancy Star, world's champion Junior two-year-old, record 17,533 lbs. milk, 808 lbs. butter.

I have recommended Schumacher Feed to many dairymen and have never heard a complaint against it.

We also feed Schumacher to our Berkshire hogs, with satisfactory results.

Yours truly,
PENSHURST FARM,
E. S. Duebler, Supt.



Fashionable Fern's Lad. Owner: Long View Farm, Lee's Summit, Mo.

IOWA DAIRY FARM

Waterloo, Iowa.

The Quaker Oats Co.,
1600 Railway Exchange,
80 E. Jackson St.,
Chicago, Ill.

Dear Sirs:

We have used Schumacher Feed in our herd for the past nine years. It has been fed consistently to our herd and we have found it very valuable for our milking cows and young stock. Some very splendid A. R. Records have been made in the last four years, including the cow, Prospect's Rose des Houards, 89,003, National Champion in 1919 and World Champion in Class GG, and Marsh Marigold that recently finished a Class G record of 12,087 lbs. milk and 568 lbs. fat. She was first prize two-year-old at the National and Grand Champion at the Dairy Cattle Congress in 1921. I feel that with the aid of Schumacher Feed it is possible for cows to keep up the flow of milk and keep in good condition with less cost than any other way.

Very truly yours,
P. L. JONES.



Langwater Valiant. Owner: John S. Ames, Langwater Dairy Farm, North Easton, Mass.

Remembering that such a cow should have at least 1 pound of hay and 3 pounds of silage for every 3 pounds of milk, the roughage part of her ration should approximate—

	Pounds Dig. Protein	Pounds Total Dig. Nutrients
12 pounds clover hay	.912	6.102
30 pounds corn silage	.33	5.310
	1.242	11.412

To supply the balance of 1.258 pounds digestible protein and 8.3 pounds total digestible nutrients, a grain ration of 10 pounds per day made up as follows, very closely approximates the cow's needs:

	Pounds Dig. Protein	Pounds Total Dig. Nutrients
2 pounds cotton seed meal	.74	1.564
2 pounds gluten feed	.432	1.614
6 pounds Sugared Schumacher Feed.....	.534	4.62
	1.706	7.798

Very few men will take the time to calculate the exact amount of feed a cow must have according to the preceding tables. A cow cannot be fed by nutrition tables solely. Her ration can be approximated, but the production of the cow, her health, her condition of body or flesh, her likes and dislikes have all to be considered. So after the calculated ration is arrived at a man must study his cow and adjust according to her needs and performance.

There are so many well established rules whereby men can approximate the needs of a cow so very closely that their neglect to take time to calculate has justification.

Let us repeat here by way of a summary the things which a man can readily remember and which will form an excellent basis for ration building.

1. A ration must be bulky, succulent, varied, palatable, digestible, nutritious and profitable.
2. A cow should have 1 lb. of hay for every 100 lbs. live weight.
3. A cow should have 3 lbs. silage for every 100 lbs. live weight.
4. A cow should have at least 1 lb. of grain for every 3 lbs. of high testing milk.
5. A cow should have 1 lb. grain for every 3½ lbs. medium testing milk.
6. A cow should have 1 lb. grain for every 4 lbs. low testing milk.

To get the highest and most profitable production cows must be in a healthy, strong, vigorous condition.

CHAPTER VI

RESUMÉ OF THE FEED INDUSTRY

THERE has been an interesting and rapid evolution in the science and practice of feeding dairy cattle in this and all good dairy countries. Dairying began as an outgrowth and offshoot accompanying beef-making.

Strictly beef production has always been associated with areas of relatively sparse population, and areas of moderately cheap lands. Horses, beef cattle, sheep and goats are the only types of live stock which are adapted to range areas or ranging practice. Those large areas of this country that will always be range areas must inevitably always largely influence the beef, mutton and wool industry of the United States.

Range management is directly opposed to dairy management. Under range conditions, little feeding and little housing is practical. Throughout the winter from Texas to the Canadian border and for hundreds of miles north of it, range cattle face all storms, all temperatures throughout the year and largely gather their own food. In the intenser farming areas the general practice is to carry the producing herd through the winter on a minimum of feeding, and even the youngsters are carried through similarly. Because the beef producer on high priced land must meet the competition of the range, his problem is always a difficult one.

All dairying has made its beginning in what was once beef sections. Consequently there has remained with many dairymen this deep seated idea that cattle should not be liberally fed. What was right as beef practice is entirely wrong as dairy practice. **Every man in the dairy business must learn this lesson of generous, efficient feeding.** Every country and section of country that has advanced in the dairy industry has devoted much energy to a study of feeds and feeding methods and has adopted in practice the proven truth.

Feeding practices have been revolutionized within the last thirty years. With a small population and great areas of cheap, rich land there was an abundance of wheat, corn, barley and oats for man and beast and these were the only concentrated feeds. There were no mill feeds. The mill products were not needed. In the early days there was no demand for wheat bran. It took a large educational campaign to bring it to its position in every ration.

As the population of the country increased and shipping facilities grew, the demand for white flour, oat meal, barley meal, table corn meals and the other forms of cereals for human consumption grew marvelously. There soon was not enough grain for both man and beast.

Increase of population was accompanied by increased numbers of live stock. More land was made arable, more crops grown. Yet withal, the demand exceeded the supply; prices of wheat, corn, oats and barley kept

advancing and remaining high. It became necessary to find new feeds. From various sources, live stock men learned the economy and the merit of mill products, materials that hitherto were entirely neglected. Experience soon determined the very superior value of these feeds and their use has constantly grown, until today these mill feeds constitute the chief source of supplies for live stock feeding and without them our present scale of live stock production would be entirely impossible.

As time passes and the population of America and the world increases, there will continue to be decreased consumption of whole grains by live stock, until eventually the only concentrates fed will be mill feeds. Already, except in abnormal times, it is feasible to feed whole grains only in heavy grain-producing sections.

The second important development now under way and rapidly gaining momentum might be called "the mixed feed idea." The mixed feed idea has come to stay. There may have been a time when the purchasing of the various ingredients separately and the home mixing of rations was the only sane practice. That was more nearly true when every farm produced generously of corn, oats, barley and other grains, for which there was a very poor market. Wherever these conditions are true today, it may still be advisable "to mix the ration" at home.

The situation in relation to feeds is quite similar to that in fertilizers. Practically all college experiment stations and farm bureau forces have persistently preached the doctrine of home mixing of fertilizers. Yet the industry has rapidly developed into one of factory-mixed formulas. The scoop shovel has its place in education; the men who actually did the mixing, who bought the various kinds of fertilizer, who loaded it out of the cars and into the shed; who mixed it, working the whole supply over two or three times, who did the sweating, who took the dirt, who paid the bills absolutely knew that factory mixing of fertilizers is preferable and profitable.

In regard to dairy cattle feeds, formerly many instructors, experimenters and county agents advocated the home mixing of concentrates for dairy cattle. Every feeder appreciates the importance of variety in the grain mixture. Normally in most dairy sections a limited amount of concentrates is produced. For home mixing the feeder must purchase a wide assortment. This frequently produces inconvenience and dissatisfaction because some of the desired feeds are not in stock. Home mixing requires much handling of a wide variety of feeds. It consumes time and labor—it gives a less desirable ration than is secured by careful milling establishments.

As with fertilizers, so with feeds. The man who wields the shovel, who handles the bags, who feeds the cows and who pays the bills absolutely knows that ready mixed rations are more satisfactory and more profitable—and his cows agree with him. Because of this knowledge by the men who feed and own the dairy cows of this country, the demand for ready mixed feeds continues to grow amazingly and their use is general in all good dairy sections.

The primary industry of The Quaker Oats Company is cereal manufacture. Its cereal business is associated with dairying. Every family package of cereal sold creates a market for a gallon of milk. The cereal output of

The Quaker Oats Company keeps over 400,000 dairy cows busy every day of the year. It requires no stretch of imagination to see in every cereal salesman a servant of the milk producer. Every piece of cereal advertising is milk-consumption propaganda. **It may fairly be said that The Quaker Oats Company, through its cereal promotion, is the greatest servant of the dairy industry and its most persistent and aggressive co-operator.**

Growing out of these milling activities is a tremendous quantity of feed products which are of the highest feeding value for all classes of live stock. Chief amongst these mill products are barley meal, red dog flour, wheat middlings, wheat bran, hominy feed and oat feed.

Oat feed is produced in the manufacture of oat meal. It consists of oat hulls, oat middlings, oat flour and more or less broken groats. These each have their distinctive feeding values. Every man who ever has fed oats has made use of them, for always the whole oat is fed. For live stock feeding, the hull is never removed, and it is very probable that oats obtain their especial value for stock feeding as much from those parts which constitute oat feed as from the oat groat. **Dr. W. A. Henry says: "That the addition of a limited amount of hulls to a heavy concentrate mixture is beneficial, seems reasonable in view of the excellent results obtained with the natural unhulled oats."**

The Quaker Oats Company are extensive makers of pearled barley and barley flour. Barley feed is produced in the manufacture of these commodities. It is a high quality carbohydrate feed resembling red dog flour. It has a high digestibility and palatability and gives special values to all rations in which it is used. This feed seldom is in the market, being used entirely by The Quaker Oats Company in making its superior feeds.

The wheat feeds are generally entirely familiar to all and need no presentation here.

Hominy feed falls in two classes—the yellow and the white. The chief difference is one of color and that is not reflected in the milk pail. There is no difference in feeding value; the cows do not show any preference for one over the other and the buyer makes a mistake by paying more for one than the other—unless the yellow color in yellow hominy is accompanied by a greater vitamine value which recent investigation tends to establish. In that event yellow corn and yellow hominy are worth more than the white. Hominy feed consists of corn bran, corn germ and some corn-starch, all removed in the manufacture of table corn meal. It is an excellent carbohydrate feed from every standpoint.

The Quaker Oats Company has always marketed its mill feeds as mixed feeds. Being unavoidably associated with the dairying of the nation, it has undertaken from its beginning, forty years ago, to build up its own business by building up the dairy business. It has always maintained a line of nutrition studies in order that its products may be unexcelled. It supports a chemical staff whose whole purpose is to maintain and improve the quality of its feeds. The Company believes that the dairyman knows his ground when he prefers mixed feeds and every effort is made to furnish mixed feeds that satisfy every demand of the most exacting feeder.

Mixed feeds are divisible into two classes: those that are balanced rations and those that are not.

Balanced Rations, Ready Rations or Dairy Rations as they are sometimes called, claim to supply all the essential protein carbohydrates and fats

required by every dairy cow in every herd of any breed beyond what is supplied in the hay and silage. The man who buys them need buy nothing else. They are generally of excellent quality and high food value. But they attempt the impossible. Always the ration must be adapted to the cow; her size, her condition, her milk yield, her fat-test are all factors which demand variation in the ration. A hard and fast ration cannot be built that will get the most profitable results with all herds or all the cows in any one herd. One must know his cow, know her production and feed accordingly.

Mixed feeds that do not claim to be Balanced Rations are either high protein blends or high carbohydrate blends. Any feed that contains a high percentage of protein secured from mixing several high protein feeds has a distinct advantage over any single protein compound. Similarly any rich carbohydrate **mixture** has a distinct value above any single carbohydrate feed. These mixed feeds avoid the necessity of the purchase of a large number of ingredients. They are already mixed; they give variety. The feeder by using them need never buy more than two kinds of feed yet secures a wide variety in his ration and can adapt the cow's feeding to her particular needs.

Recognizing the advantages from every standpoint of mixed feeds and also the absolute necessity of the cow dictating the proportion of proteins to carbohydrates if the dairy is to be profitable, The Quaker Oats Company prepares three principal feeds for the dairy industry. These are **Schumacher Feed**, **Sugared Schumacher Feed** and **Boss Dairy Ration**.

Schumacher Feed is the ideal general purpose feed. It consists of the milled products of oats, wheat, barley and corn with the addition of linseed meal, cottonseed meal and salt. Its analysis is presented in chapter five. It is finely ground, kiln dried and very uniform in texture, composition and quality.

Thousands of the best dairy farmers and breeders in this country never use any other carbohydrate feed. On account of its uniformity, its palatability, its digestibility and its variety it is the



Foulton Ambassador. Owner: Wendover Farm, Bernardsville, N. J.

best carbohydrate feed in the market. It is adapted to the feeding of all classes of stock. For milch cows it is the best source of the carbohydrate part of the grain mixture. It should form approximately from one-third to two-thirds of the grain fed the working herd. It must be combined with some high protein feed and when this is properly done

there is no better ration. It should form a large part of the ration for bulls, dry cows, young cattle and calves. For growing young stock of all classes—beef cattle, dairy cattle, colts or hogs, it stands a proven feed of worth. For work horses, for breeding stock and for meat or milk producers there is no doubt of its value. Wherever concentrated carbohydrates are needed **Schumacher Feed** ought to be used.

With all its merits **Schumacher Feed** is destined to be largely replaced by **Sugared Schumacher Feed**.

Sugared Schumacher Feed is a very recent improvement upon **Schumacher Feed**. This improvement has been accomplished by devising a special process whereby molasses may be added to a grain mixture without affecting its quality or texture.

Feeding molasses makes a distinct addition to any ration. It adds to the flavor, palatability and digestibility of any ration. It has an effect on the skin and coat that is very pleasing. Everyone likes to feed it but everyone has always found it objectionable to handle either in bulk or in most of the molasses feeds previously in the market.

Sugared Schumacher Feed combines the merits of molasses with **Schumacher Feed** and yet is free from all the offensiveness of molasses. It has very nearly the same composition as **Schumacher Feed** but is higher in digestibility and in palatability. It is a carbohydrate feed and has the same uses and wide adaptability of **Schumacher Feed**.

Boss Dairy Ration is a high protein concentrate. It is a blend in which linseed meal, gluten feed and cottonseed meal predominate, giving a splendid variety. It is guaranteed to contain not less than 24% protein. It, too, is slightly sweetened with molasses. It is a dry bulky mixture of pleasing texture and appealing aroma and flavor. It most nearly meets the demands for a balanced or ready ration. For long time production year after year where the health of the herd is an important factor, feeders will find the addition of some **Sugared Schumacher Feed** to **Boss Dairy Ration** advantageous. Any ration carrying as much digestible protein as does **Boss Dairy Ration** will undoubtedly result in high milk production, but if continually used some animals will show the need of more carbohydrates in the ration. High protein feeding is frequently accompanied by irregularities in breeding. For this reason in all breeding herds we recommend the use of a feed that is not extremely high in protein but suggest combining with such a feed additional carbohydrates.



Ladysmith's Cherub. Owner: D. D. Tenney, Shorewood Farm, Crystal Bay, Minn.

CHAPTER VII

THE SCHUMACHER FEEDING SYSTEM

PLANNING every task and following the plan pays. Planning accomplishes more in less time. Planning results in work better done. Planning saves—saves time, saves thought, saves energy, saves money.

There is no great work successfully accomplished without a carefully worked out plan, followed studiously. A small task may be finished without a plan but every great or small task is done more quickly and thoroughly if planned. Every school in the land has its time-table—its plan of teaching; every train is run on schedule; every busy man's day has its working plan; every farm is carefully laid out, and every season's cropping carefully planned. Every successful undertaking calls for a definite system. Without it there is always waste.

The Quaker Oats Company planned **Schumacher Feed** and **Sugared Schumacher Feed**. For forty years it has been making these and all its feeds according to carefully worked out plans. During all these years it has been as carefully perfecting the plans by which these feeds are made. It is intended to make these feeds the most useful and profitable feeds a man can use. They are just that.

In order to insure the fullest success with its feeds by every dairyman, The Quaker Oats Company has perfected the **Schumacher Feeding Plan**. This plan is designed to save time, energy, labor and cash for every man who follows it. We want you to know this **Schumacher Feeding Plan**; to adopt it, and through it attain the greatest possible success with dairy cattle.

This Is The Schumacher Feeding Plan

We here give the nine points of the **Schumacher Feeding Plan** for Dairy Cattle. This plan maintains the health of the herd, produces profitable production and secures success in dairying. Thousands follow it; no man can afford to depart far from it.

1. If possible, supply liberal quantities of good alfalfa or clover hay.
2. Supply silage or roots.

Succulence is essential. Silage or roots form the sources for it in winter. Grass and silage meet the need for succulence throughout the summer. The vitamins in silage, roots and grass are especially valuable.

3. Always use **Sugared Schumacher Feed** as the carbohydrate portion of the ration.

It supplies variety, palatability, digestibility and efficiency.

4. Balance it with **Boss Dairy Ration**, or balance it with the least expensive protein feed.

THIS IS A VERY IMPORTANT POINT IN FEEDING. Any man can easily and accurately determine which is the cheapest form of digestible protein. This is done through reference to the table on page 30, which gives the number of pounds of digestible protein in 100 lbs. of each of the

high protein feeds. Divide the price per cwt. of the feed by the number of pounds of digestible protein in 100 lbs. of that feed. This will give the price per pound of digestible protein in that feed.

Example: If choice cottonseed meal costs \$55.00 a ton and old process linseed oil meal costs \$48.00 a ton, which furnishes protein more cheaply? If choice cottonseed meal costs \$55.00 a ton 100 lbs. will cost \$2.75. Referring to the table on page 30: 100 lbs. of choice cottonseed meal contains 37 lbs. of digestible protein. Therefore, 37 lbs. digestible protein costs \$2.75, or, 1 lb. of digestible protein costs 7.43c.

If old process linseed oil meal costs \$48.00 a ton, 100 lbs. will cost \$2.40, and referring again to our table we find there are 30 lbs. of digestible protein in 100 lbs. of old process linseed oil meal. Therefore, 30 lbs. of digestible protein in linseed oil meal costs \$2.40, or 1 lb. digestible protein in linseed oil meal costs 8c.

On the basis of the above given prices, therefore, choice cottonseed meal is the cheapest source of protein.

In this way any man can easily determine which feed furnishes protein at the least cost. REMEMBER HIGH PROTEIN FEEDS ARE PURCHASED FOR DAIRY CATTLE FOR DIGESTIBLE PROTEIN.

5. Balance the ration according to each cow's need.

Do not try to feed the same ration to the entire herd.

6. Make the ration bulky, palatable, digestible, varied and profitable.

7. Feed liberally.

Short rations to dairy cattle of any age never produce long profits.

8. Feed according to production.

Weigh or measure the feed.

Give approximately 1 lb. of grain to every 3 lbs. of high testing milk.

Give approximately 1 lb. of grain to every 3½ lbs. of medium testing milk.

Give approximately 1 lb. of grain to every 4 lbs. of low testing milk.

9. Remember that almost all cows require at least five times as much carbohydrate material as they do protein.

Carbohydrates furnish energy and heat.

Carbohydrates maintain health.

Carbohydrates furnish the greater proportion of the solids in milk.

Carbohydrates contribute largely to growth in young stock.

SUGGESTED RATIONS

These Are All Tried and Tested Rations

Ideally, the ration should be figured for each cow in every herd, taking into consideration her weight, her condition, her production of both milk and fat.

Few men can afford to take time for such accuracy in calculation nor is it necessary. Knowing his cow, a practical feeder can approximate the correct ration at once and soon adjust it to the cow's needs.

To serve that practical feeder the rations in this chapter have been carefully calculated. A cow weighing 1000 pounds and yielding per day 30 pounds of milk testing 3.5% butter fat will very closely represent a very large number of cows. The following rations have been determined for

such a cow. These rations should with very slight modifications meet the needs of a great many dairymen.

A 1000 lb. cow giving daily 30 pounds of 3.5% milk

	Digestible Protein	Total Digestible Nutrients
Requires for maintenance	.7	7.9
Requires for production	1.5	9.4
Total needs	<u>2.2</u>	<u>17.3</u>

Such a cow will make good use of 12 pounds of hay and 30 pounds of silage.

She should have about eight pounds of a good grain mixture per day.

If a man has a mixture of clover and timothy hay, we suggest the following rations:

- | | |
|--|--|
| (1) 12 pounds mixed hay
30 pounds corn silage | 4 pounds Sugared Schumacher Feed
4 pounds Boss Dairy Ration |
| (2) 12 pounds mixed hay
30 pounds corn silage
4 pounds Sugared Schumacher Feed | 2 pounds Gluten Feed
1 pound Linseed Oil Meal
1 pound Wheat Bran |
| (3) 12 pounds hay (mixed)
30 pounds silage (corn) | 4 pounds Sugared Schumacher Feed
4 pounds Gluten Feed |

If one has alfalfa hay instead of mixed clover and timothy hay, less of the expensive high protein feed is required. The following rations with alfalfa hay have given splendid results:

- | | |
|---|--|
| (4) 12 pounds alfalfa hay
30 pounds silage | 5 pounds Sugared Schumacher Feed
2 pounds Boss Dairy Ration |
| (5) 12 pounds alfalfa hay
30 pounds silage | 4 pounds Sugared Schumacher Feed
3 pounds Gluten Feed |

Many farmers unfortunately do not grow alfalfa and only a portion of their hay contains a goodly proportion of clover. Such men must feed timothy or grass hays.

For such a condition the following ration is prepared:

- | | |
|--|--|
| 12 pounds timothy hay
30 pounds corn silage | 6 pounds Sugared Schumacher Feed
3 pounds Cottonseed Meal |
|--|--|

Suggested rations for a 1000 lb. cow giving 30 pounds 4½% milk.

- | | |
|--|--|
| (1) 10 pounds alfalfa hay
30 pounds corn silage | 5 pounds Boss Dairy Ration
5 pounds Sugared Schumacher Feed |
| (2) 12 pounds mixed hay | 30 pounds corn silage
11 pounds Boss Dairy Ration |
| (3) 12 pounds alfalfa hay
30 pounds corn silage | 5 pounds Sugared Schumacher Feed
5 pounds Gluten Feed |
| (4) 12 pounds mixed hay
30 pounds corn silage | 7 pounds Sugared Schumacher Feed
3 pounds Cottonseed Meal |

If the silage is not available its equivalent must be given in hay or some other form, preferably roots.

A ration without silage or other succulent feed:

(5) 20 pounds mixed hay

8 pounds Sugared Schumacher Feed

3 pounds Cottonseed Meal

Feed yearling heifers, and all young growing stock all the good alfalfa, clover, or mixed hay they will clean up. Young stock should receive up to 12 pounds of corn silage per day.

In addition they should be fed from 3 to 5 pounds per day of the following mixture:

1 wheat bran

3 Sugared Schumacher Feed

1 Linseed Oil Meal

For dry cows the same mixture may be used.

For dry cows getting ready for test at next freshening, feed up to ten pounds daily of a mixture made of equal parts of wheat bran, linseed oil meal and **Sugared Schumacher Feed**.

In any of these rations linseed oil meal may replace cottonseed meal with but slight variation in quantity.

AVONDALE STOCK FARM
The Home of May Echo Sylvia

Quaker Oats Company,
Peterborough, Ont.

Brockville, Ontario.

Dear Sirs:

We use Schumacher Feed mixed with other grain mixture to almost our entire herd.

We have always considered Schumacher Feed as one of the most up-to-date prepared rations on the market. Schumacher Feed has been fed to the most of our high record animals, which includes many world records.

(Signed) H. LYNN,
Superintendent, Avondale Stock Farm.



Langwater Generous. Owner: John S. Ames, Langwater Dairy Farm, North Easton, Mass.

CHAPTER VIII

MANAGEMENT OF THE DAIRY HERD

Putting the Cow Dry

In order to get the best results with a dairy cow throughout her entire lactation period she should be dry from six to eight weeks previous to freshening. Some very persistent milkers are hard to dry off and unless an effort is made to accomplish this purpose they will milk right up to calving time. When a cow does this, she gets no chance to rebuild her bodily and vital condition which is necessary, for cows that milk heavily draw upon their bodily tissue to meet the milk demands. As a consequence they are not able to do as good work in the succeeding year. Generally they do not start off with as large a flow of milk as they normally would nor do they ever attain as high a maximum flow, so the dairyman loses more in the following year than he has gained by keeping the cow at work for the two months she would have been resting and recuperating.

Neither is the cow likely to produce so large or strong a calf if she has not been given her rest period. During the last two months the growing foetus makes considerable demand for mineral and proteid material. This it fails to get if the cow at the end of a hard working period is still required to produce milk.

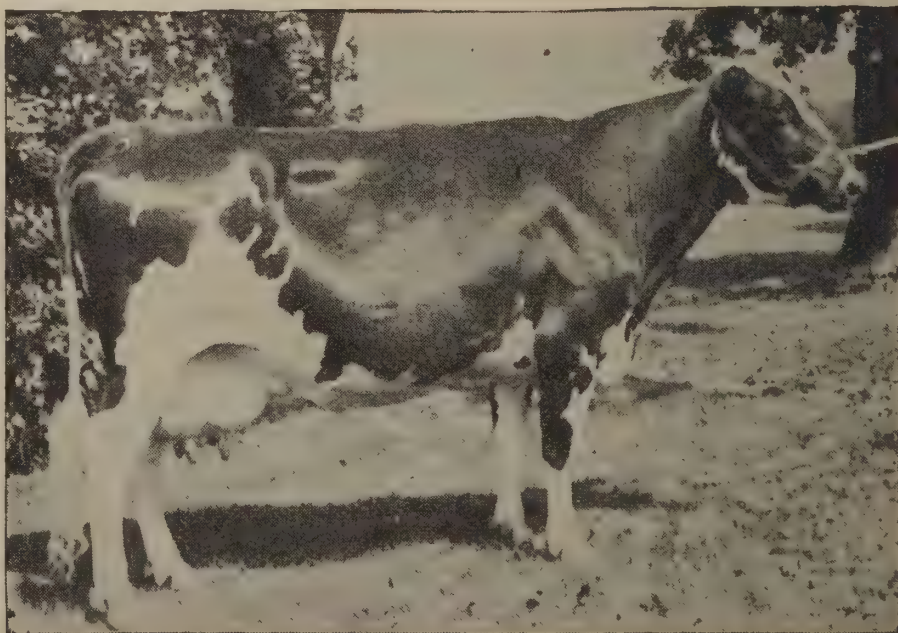
Experience fully establishes the wisdom of letting the cow go dry for about two months.

With cows that are at all difficult to put dry, the following suggestions will be found useful:

1. Take away all silage, roots, and other succulent feed.
2. Feed no grain.
3. Feed coarser hays, timothy, or even straw or corn stalks.
4. Milk the cow only once a day for three days; then skip a day entirely

and milk her only once a day and only every other day for three days. When the cow gives only ten pounds of milk, milking once a day, milking may cease entirely.

When the cow is dry, begin to feed her liberally again. Give her good legume hay, good silage, or other succulent feed, and a grain ration that is three parts **Sugared Schumacher Feed**, one part bran, and one part linseed meal or



Doetje Nellie. Owner: Aitken Bros., Meadow Lane Farm, Waukesha, Wis.

cottonseed meal. Feed liberally of all feeds. Too many men attempt to economize by feeding dry cows lightly and on poor feeds. Such practice is a costly mistake. Only by generous feeding can the vitality and vigor of the cow be built up so that she can begin hard work again. Give all the good clover, hay and silage the cow will eat. Feed at least six pounds of grain daily. For a cow that is being prepared for a short time test, limit the silage and feed all the grain the cow will eat, making the mixture of equal parts of **Sugared Schumacher**, Gluten Feed, and Oil Meal. The right kind of a dairy cow will build up and grow fat under such feeding. She will, too, have less trouble at freshening, and will produce more heavily and will in the first three months of her milking period transfer all surplus fat from her body to the milk pail.

Feed fed a good dry cow for two months is never wasted or lost.

Care at Calving Time

The cow should be placed in a clean, comfortable, quiet box stall at calving time. Preferably place her in this stall from three to six days before calving so she will feel at home and be contented.

The cleanliness of this stall is of very great importance. It should be as clean as fork, shovel, and broom can make it. It should then be thoroughly disinfected. This can be done by spraying the wall with a five per cent solution of carbolic acid, a two per cent solution of cresol or creolin. The stall should be bedded with clean, dry straw, preferably chaffed. The stall should be cleaned every day and the cow made thoroughly comfortable.

The cow should not be disturbed at calving time. For that reason it is desirable to have the calving stall shut off from the rest of the barn.

In most cases cows do not need assistance to bring forth their young. This is especially true if the animals have been properly rested, properly fed, and brought to a good, healthy, vigorous condition. Young heifers and old cows, however, frequently do need help. The man who proceeds to give help must not proceed in ignorance. Ignorant assistance is often more fatal than none. The herdsman **must know** the normal presentation of the foetus, for oftenest a cow has trouble because of mal-presentation. In normal presentation the forelegs are extended with the head stretched out upon them, the back being upwards. Before attempting to give any help the man, baring his right arm to the shoulder, should examine the position of the foetus to see if it is normal. Be sure the animal must have help before interfering. If one is in doubt and if a veterinarian or other experienced person is within reasonable distance, get that assistance rather than err; the cow will not usually be lost by spending three or even more than six hours in getting the right help.

If cows are on pasture during the summer it is preferable to allow the cow to calve in the field. There is no cleaner, more sanitary place than a clean sod. Preferably though, one should be able to observe the cow at this time, though in a field.

Management of Calf at Birth

Some men remove the calf from the cow immediately after it is born so that every care may be taken to prevent its getting any disease germs. If the calf is removed

it should be thoroughly dried and taken to a clean, comfortable calf pen. If it is left with the cow, the membranous sac surrounding the calf at birth

should be removed and the calf partially dried; there is an advantage in the cow licking the calf dry—the licking stimulates the circulation and respiration of the calf and the mammary circulation of the cow.

In any event the navel cord should be thoroughly disinfected, tied about two inches from the body with a disinfected thread by disinfected hands and then severed. It seems certain that certain serious infections of the new born calf and of the future cow gain access through the navel.

The calf should get the colostrum or first milk of the cow. It should get only a little at a time, but during the first two days should be given that little every two hours, and it should eat at a clean lunch counter. In other words, if it sucks the mother, one should see that the udder and teats are **clean** for the calf. The very best authorities believe that a cow that has infection of the uterus is very likely, by the smearing of the udder and teats, to communicate that infection to her calf at its very first meal unless care is taken. That is one reason why many men take the calf away at once after birth. But if the calf is removed, **be very sure it gets the colostrum** which is needed by the digestive system of the calf.

Do not milk the cow at all during the first twenty-four hours after calving.

Feeding Before Freshening During the two months' dry period previous to freshening, the cow should be fed liberally. The purpose of this period is to allow her to build up her body and her vitality. This can only be done by liberal feeding of good feed. Give her plenty of good clover or alfalfa hay. The silage or succulent feed need not be fed in as generous quantities during this period but concentrates should be liberally fed. Some good feeders feed just as liberally during this period as when fresh. At least six pounds of grain feeds per day should be given the dry cow that freshens soon. Three-fourths of the concentrates should be carbohydrates, unless one is preparing to make an advanced Registry record when the cow freshens; wheat, bran and linseed oil meal may constitute the rest of the grain mixture. It is desirable to give the cow a laxative of either one pound of Epsom Salts or a quart of raw linseed oil meal about a week before calving. For this last week make about one-half the grain mixture wheat bran. The twenty-four hours before and the forty-eight hours after calving give water that is about 70 degrees temperature and less feed.

Remember the period of parturition is abnormal, is critical, and that the cow is in a physically weakened and resistless condition. For the day before and the day after calving keep clean, bright, good quality of hay before the cow and give only bran mashes made by pouring scalding water over bran thoroughly saturating it.

Great care must be taken to avoid drafts or exposure for the first day. It is advisable to keep the cow blanketed. Pneumonia and other serious troubles are very easily induced at this time. For the same reason, the stall should be well bedded to keep the cow off the cold floor. Especially is this true if the floor is cement.

Milk fever, garget, and the other troubles of this period are treated in another place, so we shall not discuss them here. But one must know that the improper handling of the cow at this time is the chief cause of most of these serious troubles. See pages 55 to 61.

Feeding the Fresh Cow

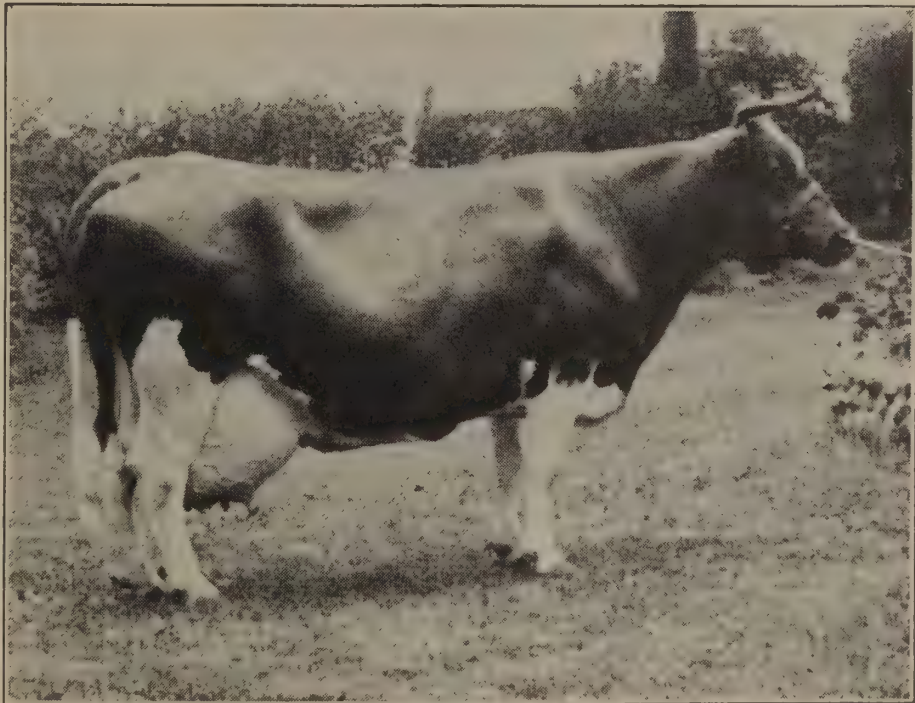
For the first week do not try to feed the cow heavily. One's chief purpose should be to get the inflammation and swelling out of the udder and to get her into normal health again.

This may be accomplished in four days, or it may take more than a week. As soon as she appears well, shows good vitality and has an interest in food, begin to lead her toward her fullest production. Beginning at from six to eight pounds of grain feed a day, increase her ration by one pound every other day, watching the increase in the amount of milk yielded. Keep on increasing the grain so long as the milk production increases. During the last stages the increases of grain should be only one-half pound every other day. When there is no longer any response by increased flow, no more increases in the grain should be made. This point is the cow's maximum capacity for milk production. With some cows one could continue to give more grain but the cow would give no more milk. The excess grain would be converted into body fat; but eventually there would come a point where the cow would begin to leave the grain—she could eat no more. That point represents her capacity for food. Some cows reach their milk producing limit before they reach their food limit. Other cows reach their food limit before they reach their milk limit. These latter cows will milk themselves thin, no matter how much feed is given them, while the former need to be watched or they will eat more than they give returns for; these are inclined to beefiness and from a dairy standpoint can only be profitable when fed with care.

Most Profitable Feeding

After a few days it would be found that a cow can be maintained at her milking limit on a little less feed per day than was required to get her up to that point. When this correct amount is found, the cow wants to be given that grain every day. This point of full production on just the amount of grain required to obtain it represents the most profitable point at which to hold the cow.

During the first three months of the lactation period nearly every dairy cow milks generously. Some will maintain this heavy flow for a longer period, but generally at about the fourth month cows begin to fall off slightly and this decrease is gradual to the end of the milking period. Proper feeding will bring a larger daily yield from every good cow during these first three months; it will also maintain her daily yield at a higher



O.K.L. Tula. Owner: Julius Schmidt & Son, Beaver Dam Stock Farm, Montgomery, N. Y.

level during the succeeding months so that the yield for the entire period will be much greater than when cows are wrongly fed or underfed. Good cows of the Jersey and Guernsey breeds frequently have finished their tenth month producing twenty, twenty-five, or even more pounds of milk a day. Good Holsteins and Ayrshires have finished a year's work at thirty, thirty-five or more pounds a day. This is accomplished only with excellent cows but it would never happen with them if they were not carefully fed.

How can a man feed to get that result? By studying the production of his cows, their physical condition and the feed he gives them.

In addition to what has already been said advising feeding according to the cow's production, every cow's condition must be watched and her ration adjusted accordingly. If a cow is growing thin, she must be given more carbohydrates. Most good cows do grow thin during the first three months and yet maintain their milk flow. This thinness can be offset by adding carbohydrate material to their ration—by feeding the cow somewhat more than the standard indicates and making that addition of starchy feeds. On the other hand some cows begin to drop off in production and to lay on flesh. Such cows must be given a greater proportion of protein in their concentrates to get greatest production from them—even then many of them will not respond because they are not markedly of dairy temperament. With these, the best thing to do is to give them a chance, study them, and if they fail to respond, replace them by cows of more marked dairy breeding as soon as possible.

A cow's lactation period may be likened to a toboggan slide, with different starting points. If one enters the slide near the bottom of the hill, he does not have far to descend, he does not acquire much speed, yet is about as long making the slide because he travels slower and most of the time is spent on the level finishing area; but if one goes to the top of the hill—especially a long high hill—he travels faster, rides farther

and spends a greater part of the time on the slide rather than on the finish. Just so with cows. If we have good cows and work them to a high peak of daily work in the first, second and third months, they have acquired a momentum which will cause them to coast on a higher level all through the lactation period and bring them to the very finish at quite a high speed.



Penshurst Rising Star. Owner: Wm. T. Tonner, Glen Foerd Farm, Torresdale, Pa.

Pasture Valuable

Cows that have been housed for the winter period without access to the fields for months particularly appreciate spring with its fresh green grasses. Cattle crave grass. It possesses a combination of nutrients and other characteristics found nowhere else. Even though cattle have been well fed, available pasturage is beneficial to them.

Cows should not be put on grass until it has made a fair growth. Scarcity of feed on one hand and eagerness of the stock on the other, together very often get the cows upon pastures before the ground is well dry and before the grass is well started. The grass is very tender and watery for the first ten days of its growth—so watery that it markedly purges the stock. If pastured when very young, the vitality of the grass is seriously affected so that the amount of grazing available for the balance of the summer is considerably diminished.

Need of Summer Feeding

For about one month in the spring after turning to pasture most dairy cows will refuse to eat grain of any kind. Yet even if the grass be luxuriant a heavy milking cow is not able to gather enough food to meet the dry matter requirements in the milk she makes and to maintain her physical condition. All really good dairy cows grow thin on pasture alone; their skin and their hair is in good condition, their general health is excellent, but they lose flesh. Consequently for the sake of the cow and to obtain maximum yearly production it is highly desirable to feed grain to the milking herd during the summer months.

For the guidance of the dairyman it is recommended that a Jersey or Guernsey giving twenty pounds of milk or more per day, and a Holstein or Ayrshire giving twenty-five pounds per day while on pasture should be grain fed. The amount often may be regulated by the cow; in other cases it must be determined by the feeder, depending upon the temperament of the cow, her condition, the prices of feed and of milk.

The grain mixture for feeding on pasture should be very largely carbohydrates. The fact that on grass alone cows grow thin and then begin to shrink in milk yield indicates very strongly that carbohydrates are needed and must form the large part of the summer grain ration. This conclusion is supported, too, by the knowledge that grass at the grazing stage is very high in proteid material and demands a liberal supply of carbohydrate material to properly balance it. **Consequently Schumacher Feed, or Sugared Schumacher Feed should constitute the greater part of the summer's grain ration.**

Summer Roughage Feeds

In addition to feeding grain during the summer in most localities it will be found necessary to supply other feed to the dairy herd. In almost every section of this country pastures prove inadequate for at least part of the time; in a larger part of the country July and August cover the period of poorest pasture. During this time it is an established custom to feed green feeds such as fresh cut clover hay, green oats, corn, millet, peas and oats or any other bulky palatable, succulent crop that may be ready. These feeds are cut in the green stage and fed as soon as cut. This method of feeding is called soiling, the crops being called soiling crops.

Soiling and Silage

Soiling has disadvantages; it requires considerable time and labor at a busy season of the year, and it is difficult to get a succession of crops so that one can have a supply of green feed for a considerable period. As a consequence silage feeding in summer time

is very largely replacing soiling. Farmers either build their silos large enough to hold enough for both winter and summer or else build a second smaller silo to be used exclusively in the summer.

Cattle will not eat as much silage in the summer when pasturing. Usually they will consume about fifteen pounds a day, seldom exceeding twenty-five pounds per cow per day. This may be given at one feeding.

Spring or Fall Freshening The natural season for cows to produce their young is in the spring and the greater number of dairy herds at present freshen at that time. This is particularly true in cheese producing sections. Cows require less labor or attention when freshening in the spring which probably largely accounts for continuance of the practice. When dairying is of secondary importance on a farm spring freshening is general. Whenever dairying tends to become the major farm industry the practice becomes established of fall or early winter freshening—thus lengthening the period.

There are many advantages arising from fall freshening. A greater yearly production usually results. For the first three months of the lactation periods cows produce heavily; by the fifth month they are beginning to decline. Grass stimulates increased production so that turning to grass at about the fifth month tends to maintain a higher production during the last half of the lactation period. July and August are difficult months to maintain a milk flow on account of heat and flies. If July represents the third or fourth month of the lactation period, one is likely to get a slump to a lower level in production that will affect all the rest of the period.

Calves born in the fall or early winter if properly cared for will make greater growth and earlier maturity than spring born calves of the same age. For their first six months calves cannot and should not be expected to make any great use of grass. In fact better calves will result from pen feeding for



Showing Splendid Character, Strength and Masculinity

the first six months. Calves born in the fall are sufficiently large and well grown by spring to go on pasture in the spring at six months of age. Spring born calves if maintained in paddocks as they should be until from four to six months of age will be a year old before there is pasturage available for them and they are able to really use it. As a consequence the fall born calves make a more rapid development.

CHAPTER IX

FEED, CARE AND MANAGEMENT OF THE CALF

THE care of the calf at birth is discussed in chapter nine. The most important points of that discussion are:

1. Disinfect the navel thoroughly, using
 - a 5% solution of carbolic acid, or
 - a 2% solution of cresol, or
 - a 2% solution of liquor cresolis compound.
2. Be sure the calf gets the colostrum or first milk of the mother, either by remaining with the mother for the first two days or else by careful hand feeding.

The calf naturally feeds lightly and frequently. If the calf is taken away from the mother at birth, for the first three days it should be fed the mother's milk at least four times a day, never giving a small calf more than two pounds at one time, nor a large calf more than three pounds at a time. Overfeeding of the young calf is more frequently the cause of scours than is underfeeding.

In feeding the calf, be particularly careful to have

1. The pail from which it is fed clean, and
2. The milk of body temperature.

Cleanliness Washing the pail with hot water is scarcely enough. Thoroughly scrub it and disinfect with live steam if possible; if that is not available, use scalding hot water. Have the pail just as clean for the calf as you would for yourself or for your children.

Calfhood the Time for Growth There are three fairly well defined periods in the life of man or beast. These may be called the periods of Youth, Maturity and Decline. With the calf the period of youth occupies the first five years of its life. Youth is the period of growth. It is an established fact that if growth is not attained during the period when it should be it can never be fully reached. The younger the animal the greater its capacity for growth. Consequently, the first two years of a heifer's life are the most important from a growing standpoint and of this time the first six months are the most important. It should be every man's policy to keep every young animal growing as constantly and as rapidly as is possible, thus securing a large, strong, early maturing animal which means a longer-lived, heavier-producing animal, other things being equal.

"Never neglect the calves." The younger they are the more important that maxim is.

There are three fairly well defined methods of raising dairy calves—

- 1—On whole milk 2—On skim milk 3—On milk substitutes.

Whole Milk Feeding Whole milk is the natural ration for raising calves, but on dairy farms where whole milk is sold for city requirements or for cheese factories, or where cream is sold to the creamery, the farmer finds it more profitable to raise his calves some other way. Only

the breeder of high class pure breeds can justify a long period of whole milk feeding.

Milk that carries a high percentage of fat is better for calves if at least one-half of the butter fat is removed. A high fat content in milk causes digestive troubles that are usually accompanied by scouring. For this reason the milk of Jerseys and Guernseys does not always give the best results fed whole to calves.

Skim Milk Feeding For the first ten days every calf should receive whole milk. This should be the mother's milk for the first five days. Small calves should not get beyond eight pounds a day and large calves not beyond twelve pounds per day. After the tenth day with a healthy calf one may begin to gradually substitute skim milk for whole milk. This change must be made gradually, taking in all about ten days to change ration entirely into one of skim milk. Thus, at the end of three weeks the calf will get along entirely without whole milk.

If one has an abundance of skim milk it may be fed quite liberally, as the calf grows, always, however, never gorging the calf. Few, however, have this liberal supply. Where the supply is short if it can be arranged to give the calf a restricted supply of only four or five pounds a day the result is decidedly good. If at all possible, milk should be fed until the calf is four months old.

Hay and Grain for Calf From the time the calf is three weeks old it will begin to nibble at and eat some roughage and some grain. From that time on some choice, fine, clean, palatable alfalfa, clover, or mixed grass hay should be placed where the calf can get at it freely. Also, from the time the calf is ten days old it should have access to grain. For the first six weeks this is best done by placing grain in an open box in the pen and keeping some grain in it. The calf thus learns to eat grain, and from that time forward grain may be fed regularly twice or three times a day. Until the calf is six months old it may be fed as much grain as it will eat.

The following grain mixtures are all good:

No. 1

3 pounds cornmeal
3 pounds **Schumacher Feed or Sugared Schumacher Feed**
1 pound bran
1 pound linseed oil meal

No. 2

6 pounds **Schumacher Feed or Sugared Schumacher Feed**
3 pounds bran
1 pound linseed oil meal

No. 3

3 pounds **Schumacher Feed or Sugared Schumacher Feed**
3 pounds ground barley
2 pounds bran
1 pound linseed oil meal.

Milk Substitutes Many calves are successfully raised without any milk beyond the first months, being given calf meals. There are several of these in the market, some of which, manufactured by old established firms and having proven themselves through the years, are entirely

usable and reliable. In using a calf meal it is important that directions be carefully followed. If this is done quite as satisfactory heifers will be produced as from any other economic method of feeding.

Schumacher Calf Meal Schumacher Calf Meal contains just the right ingredients to properly nourish the growing calf. It is a splendid substitute for milk. Hundreds of successful dairymen start their calves on Schumacher Calf Meal, not only getting stronger, more rapid growing calves, but are able to sell all the milk.

In feeding with calf meal as with every other method of feeding, grain and hay should be fed.

When the calf is six months old, all milk or milk substitutes may be discontinued; if they are available their use will give splendid results but it is not absolutely necessary that they be used longer, providing the calf has been properly fed on grain and hay, as already suggested.

Exercise, Air, Sunlight Fresh air and exercise are essentials for the health of calves. Calves well started do not require particularly warm quarters, but like all other kinds of stock, exposure to drafts are very serious. For the first two months calves born in the fall or winter should be kept either in small individual pens or in box stalls of medium size in which three or four calves may be kept together. By all means endeavor to let a goodly quantity of direct sunlight enter these pens. So arrange the pens that drafts do not pass through or over them. Keep the pens clean; remove all damp bedding every two or three days, and daily put in plenty of clean, fresh bedding. For the very young calves, until they are about two weeks old, a box stall in the dairy barn insures their comfort. If they are healthy and well they may then go to the calf or young stock barn.

Where two or more calves are in the same stall they should be tied up for feeding both milk and grain. By keeping them tied for a half hour after they have had their milk and giving them their grain at that time, there is less likelihood of their getting into the habit of sucking.

A Calf Shed After the calf is approximately two months old, it will appreciate and enjoy housing in a shed which affords free access to an outside, clean, dry yard. Even in cold climates during the winter, except in extreme weather, the door leading to this yard should be left open all day. The apparent health and comfort of the calf is the best guide for one's practice.



Highland Polly and her Owner. Owner: Stephen Bull.
Aldebaran Farm, Racine, Wis.

A calf born in the fall, by the time it is six months old, is ready to make full use of grazing—and at that time the grazing should be ready for the calf. If one provides excellent pasturage for the calves at this time they will need nothing else. If the pasture is only medium quality, one will be well repaid by feeding a few pounds of grain to the calves once a day. Feed fed to young growing heifers of the right breeding is never wasted.

In the pasture, if possible, there should be a supply of fresh running water; there should also be shade.

From the time heifers are six months old they should be liberally fed on roughages, giving them from eight to twelve pounds of silage per day and as much good clover or alfalfa as they will eat. With this should be fed approximately four pounds of concentrates a day. For this use one of the following mixtures:

No. 1	No. 3
3 pounds Sugared Schumacher Feed	3 pounds Sugared Schumacher Feed
1 pound bran	3 pounds ground corn
	(or hominy feed)
No. 2	3 pounds bran
7 pounds Sugared Schumacher Feed	1 pound linseed oil meal.
2 pounds bran	
1 pound linseed oil meal	

Heifers should be kept growing and in fair flesh. They should not be too closely housed and should have exercise.

Age to Breed Heifers that have been well grown, depending somewhat on the breed, may be bred at from fifteen to twenty-one months. Jerseys are earliest maturing and generally should be bred to drop their calves very closely to two years of age. A good many Ayrshire breeders are inclined to delay the first freshening of their heifers until they are about thirty months old. Every man must be his own judge in this matter, there being many affecting factors.



Ultra Select. Owners: J. L. Hope, Madison, N. J., and W. H. Gratwick, Linwood, N. Y.

During her first milking period a heifer should be liberally fed beyond the ordinary milk requirements, because she herself is immature and should make a marked body growth during this year. In addition, she has been rebred and so is also developing a foetus.

The heifer in her first lactation period should be milked the full ten months and every effort taken to establish with her a habit of persistent production.

CHAPTER X

COMMON DAIRY CATTLE DISEASES—THEIR SYMPTOMS, CAUSES AND TREATMENT

WHETHER it be for man or beast, prevention is the surest and least expensive doctor. Always the wise practice is to so feed and care for one's live stock that they shall not require medical treatment. The services of a veterinarian might far better be engaged regularly to maintain a herd in good health rather than to occasionally visit the farm to attempt to prevent the utter loss of one or more animals. Not only are the veterinarian's services in themselves an item of consequence but the dairyman loses on the production of the animal, often for a long time, if he does not lose the animal entirely.

Exercise, fresh air, comfortable, sanitary housing, sane feeding, with reasonable care, will take most herds through the year with few mishaps. Nevertheless in herds carefully managed there is scarcely a year goes by without its serious incidents.

This chapter presents the more common difficulties and diseases that may arise, their causes, proper preventive management, and where possible indicates the procedure to procure restoration and relief.

Veterinary Equipment In every dairy barn there should be a clinical thermometer, a trocar and cannula, a drenching bottle, teat tubes, a milk-fever outfit, a syringe, a funnel, rubber hose. There should be a supply of:

Epsom Salts, or	Tincture of Gentian
Glauber's Salts	Boracic Acid
Castor Oil	Sulphate of Copper
Raw Linseed Oil	Tincture of Iodine
Creolin	Nux Vomica
Vaseline (Carbolized)	Bichloride of Mercury Tablets
Tincture of Ginger	Saltpeter.

These should be stored in a medicine chest or cupboard which is kept locked.

The temperature of cattle is taken per rectum. Normal temperature in the mature animal is between 99° and 100° F. In calves it is higher and frequently individuals will normally have a temperature of 101° to 102° F. A thermometer is easily and quickly used and is informing.

The trocar and cannula are used specifically for bloat.

A drenching bottle should have a long tapering neck. It should hold one quart. It may be either rubber or glass—the objection to glass being its fragility.

Teat tubes are required for cases of sore teats, injured teats, and all cases where milk cannot be drawn readily by hand. They should be of different sizes for teats of different sizes.

A milk-fever outfit is needed in every dairy possessing really good cows. It is the one sure method of treating milk-fever.

Rubber hose of different lengths and sizes with funnels is needed for douching purposes.

Every instrument should be thoroughly cleaned after being used. Every instrument should be disinfected before being used. Always make a disinfecting solution in which to place instruments before inserting them into the animal's body.

Diseases

Indigestion Indigestion is caused generally by wrong feeding, by over-feeding, or by feeding musty, mouldy, or otherwise spoiled feeds. The animal may refuse food, become harsh in hair and skin, be constipated and feverish.

Withhold all feed (except water) for from 12 to 24 hours. Give the animal at once from 1 to 1½ pounds of Epsom salts or from 2 to 3 pints of raw linseed oil. If in six hours the physic does not act, repeat the dose. If improvement does not result inside of twelve hours with such treatment call a veterinarian.

Bloat or Hoven Bloat is usually caused by pasturage on clovers, alfalfa, or other legumes when wet with rain or dew. It is a condition of rapid fermentation in the paunch of the animal. Soiling crops sometimes cause bloat; mouldy feeds may be the cause. In mild cases the animal may recover with treatment. In severe cases tapping is the only relief. This is done with the trocar and cannula, or lacking them, with a pocket knife. The cannula remains in the opening after withdrawal of the trocar, thus facilitating the complete escapement of gas. Be sure the trocar and cannula are disinfected.

Poison There are many poison plants that are severe in their effect. The commonest of these are—water hemlock, water parsnip, wild lupines, and wild larkspurs.

The best treatment for poisoning is prevention. Animals will not usually eat these poisonous plants except when other grazing is not available. Consequently supplying good pasturage or plenty of other feed will to a large extent prevent any trouble. Once, however, they have eaten of them the animals become like drug addicts and seek these feeds. In the range areas of the country, animals poisoned on these plants are described as "locoed." Little can be done to produce immediate recovery in poisoned or locoed animals. Always the animal should be kept from getting more of the poisonous plants.

Animals are frequently poisoned by lead paint, either by licking the paint off freshly painted sign boards in the pasture, freshly painted buildings, or even from getting at discarded paint pails. In the spring particularly, after long housing and probable deficient mineral feeding, there is something in the flavor of lead paint that appeals to stock. Lead paint is deadly. Do not let animals have an opportunity to get at it.

Ordinary Scours Ordinary scours in calves are a simple digestive disorder, the result of carelessness in feeding. They are easily prevented and readily overcome. If not attended to they seriously upset the thrift and growth of the calves. When they appear, cut the feed in half, give a dose of castor oil (½ pint). Clean all utensils. Give a light ration of boiled milk containing a teaspoon of blood flour.

For scours in cows, study the feeds, to see that no frozen, mouldy or spoiled feed is being fed; withhold the succulence in the ration, and cut the balance of the ration in two. Give a dose of linseed oil or salts and gradually work back to normal amounts of feed, being particularly careful regarding pasture, silage, roots, succulence, or spoiled feeds.

White Scours White scours is a germ disease. It occurs in calves generally when a few days old. It is probably caused by an infection through the navel at birth or through the mouth when sucking. It is generally fatal; at least is always serious, and is easily communicated to the entire calf herd. It is generally thought to be closely related to venereal diseases of some form in the mother.

Care in having a clean stall for the cow at parturition, in keeping the udder clean for the calf when it sucks the mother, and in thoroughly disinfecting the navel at birth are the three very best methods of avoiding white scours.

Foul Foot Foul foot is usually an infection in the clefts of the feet of cattle. It is a bacterial or germ disease. It usually arises in the winter time, when the cows, being stabled, stand with the hind feet in the gutter. The skin gets tender, becomes abraded in some way, which allows of infection. Sometimes the infection occurs in pasture. Usually the infection becomes well established before the animal goes lame and the owner realizes its presence.

It is difficult to eradicate. The feet must be cleaned thoroughly. The affected animals should be given a clean, dry place to stand. Make a saturated solution of copper sulphate, put in a pan, and stand the infected feet in it, making sure that the solution is deep enough to come above the hoof-heads. Powdered boracic (boric) acid, dusted into the clefts, helps to dry and heal the sore. A 5% to 10% solution of creolin may be used instead of copper sulphate. For severe cases a bran or other poultice is used.

Again cleanliness which will result in avoidance of this serious trouble is much better than curative steps.

Lice Lice are a common trouble where cattle are stabled for long periods. They occur more frequently in young stock, but also infest the whole herd. They annoy the cattle and decrease the thrift and efficiency of all animals infected. They disappear from stock at pasture.

To free winter quarters of lice, using a 2% solution of creolin or a kerosene emulsion, thoroughly wash the stable in the spring after the cattle go to pasture, again in ten days, and again in the autumn before the cattle go into winter quarters.

Dipping or spraying the cattle is a frequent method of cleaning them. This cannot be done with milch cows, or hardly safely in winter with any. Using the clippers, clip a strip about 4 inches wide from tail to horns along the backbone. Dust pyrethrum powder along the back and brush well into the hair, down the sides, at the elbow, at the flank, and in the twist. In this way lice may be kept in control through the winter.

Tuberculosis Because it is thought bovine tuberculosis may infect the human family, a great deal of attention has been given this disease in relation to all types of stock. The disease has had quite a marked

increase throughout the herds of this country, especially the older parts. Except where efforts have been taken to maintain a healthy herd free from this disease, it is probable that almost every dairy herd is infected. The disease is most common where housing conditions are most intense, while in the milder climates where artificial conditions are not so extreme, live stock are much freer of this infection.

There is no known cure for this disease.

The only way of getting rid of this disease is to get rid of the infecting animals. One animal jeopardizes a whole herd, and may infect many inside of a few months.

Those animals having tuberculosis may show it by their physical condition, but the surest way of detecting infected ones is by the tuberculin test. The details of this test need not be discussed here. It is wise practice to have one's herd accurately tested; to get rid of the diseased members; to thoroughly disinfect the stables and make every effort to maintain a clean herd.

The U. S. Government, in co-operation with State Departments of Agriculture, is carrying on a large work aimed in the eradication of tuberculosis from all live stock in the United States. It is a work deserving the fullest support and the honest co-operation of every dairyman in the nation. Details regarding tuberculosis eradication may be readily learned from either one's State or the Federal Department of Agriculture.

Abortion Whenever a cow aborts, a man should endeavor to find the true cause. While abortion may be due to accident, one must be sure before he draws that conclusion. Generally abortion is due to a diseased or infected condition of the reproductive organs. Whatever the nature of the infection (and it may take various forms), the result is that it causes the repulsion of the foetus before it is mature. This is a germ disease and is communicated as such. A cow that aborts usually has a discharge from the vagina, and this discharge, becoming spread by her through the barns, yards, and fields, may readily infect the rest of the herd.

The bull also serves as a means of carrying the infection throughout the herd. To prevent him from being a carrier, the sheath should be disinfected after every service, using a $\frac{1}{2}$ of 1% Lysol solution.

A heifer may be infected when sucking its dam for the first time, or it is believed it may be infected previous to birth and fail to carry her very first calf full time.

Great care should be taken to thoroughly disinfect the box stall where an aborting cow has calved. The cow herself will require medical treatment, as not only the vaginal tract but all the uterus requires thorough irrigation and disinfection. This is not a layman's task.

The infected cow usually has a colored discharge which is rather characteristic and is not present in healthy animals.

It is very probable our artificial methods of handling cattle, crowding them for heavy production without enough attention, particularly to the mineral part of the ration, has resulted in the rapid increase of abortion until most herds at some time have been, or are, infected.

Mummified calves—dead, stone-like foeti that often are carried over-time—represent one form of abortive infection.

Cows that have aborted two or three times usually become immunized and thereafter carry through the full period of gestation. They probably continue to carry and scatter the infection, and are dangerous animals to retain because they endanger the rest of the herd.

Contagious abortion is a serious menace to a herd. It can only be successfully handled by a skilled veterinarian who has given study to this particular disease. If it is present or if an owner suspects its presence, it is advisable to get in touch with a competent veterinarian, and have the whole herd examined and put under treatment. It is expensive, but it will be much more expensive to let it continue to take toll indefinitely from the profits of the herd.

Sane feeding with attention to the mineral part of the ration will greatly help to eradicate the trouble. Do not sell suspicious individuals to uninformed neighbors.

Barren-ness The inability of cows to conceive, usually called "barrenness," is closely associated with abortion, both being the result of diseased genital organs. Very often cysts will be found on the ovaries of barren cows. By manipulation these are broken down and conception will follow. Frequently cows at about seven years of age become barren for this reason. If taken in time most of them can be restored into regular breeders. Both barrenness and abortion require the skill of an experienced man. Most herdsmen acquire in a few years the necessary knowledge to do most of the work, but always under the guidance of a veterinarian.

Retained Afterbirth Retained afterbirth frequently follows underfeeding. If cows are well fed, there is much less trouble of this variety. But if well fed animals retain the afterbirth it is an indication of diseased genital organs. Retained afterbirth is closely associated with contagious abortion. Giving a warm bran mash a few hours after calving, keeping the cow warm and giving a physic may overcome the difficulty. If the afterbirth does not come away in about six hours, it is advisable to attach a two-pound weight to it. If after forty-eight hours it is still retained, it should be taken away by an experienced person, as serious damage can be done in ignorance.

Eversion of the Womb Occasionally after calving and sometimes before, cows because of the relaxation of these parts extend the womb through the vagina. Indications are usually given before this actually happens, and a watchful herdsman will use preventive methods. When a cow shows signs of this, elevate the rear parts several inches and keep her in that position until she appears recovered. If the cow is straining in an endeavor to cause eversion a truss should be used. A veterinarian should be called. This trouble is also called "Casting of Withers."

Ringworm Ringworm is a parasitical infection. It is contagious. Thoroughly wash the affected part and apply an ointment made from mixing lard with flour of sulphur.

Cow Pox Blisters form on the teats or udder containing a yellowish fluid. Use carbolized vaseline. The trouble is contagious but not serious.

Garget or Mammitis Garget occurs only in good dairy cows. A slight congestion of the udder is normal at calving time, but exposure to cold or drafts or other neglect may bring on an aggravated inflammation. The udder becomes very hot, very red, and hard; the milk shows clots or streaks of blood, and if not relieved a general fever condition results. Milk secretion is impeded and abscesses result, followed by the loss of one or more quarters of the udder. The milk should be frequently drawn. The udder should be massaged long and frequently, using hot fomentations and rubbing in some good ointment, or camphorated oil, or skunk oil.

Garget may be due to an infection, and if so is very difficult to overcome.

Milk Fever Milk fever is a common and inevitable trouble with good cows. The surest way of avoiding it is to have cows that are not worth keeping. The cow does not have a fever, but a subnormal temperature. Heavy feeding just preceding parturition, especially if the cow be in high condition, tends to bring about the condition. Lack of exercise may also predispose the cow. It rarely happens in a two or three-year old heifer. It usually happens within twenty-four hours after calving.

The cow becomes drowsy, the eyes dull and staring; the animal sways, stumbles if walking, eventually falls, and is unable to rise except on the front feet. There is a paralyzed condition in the rear parts particularly; the œsophagus is also paralyzed, and the cow cannot swallow. Good cows have been killed by attempting to drench them when afflicted thus, the drench going down the windpipe, causing pneumonia.

A spare laxative diet for four days prior to calving, accompanied by a dose of salts, light feeding after calving, and particularly postponing the drawing of any milk for from 12 to 24 hours after calving, will greatly prevent milk fever.

If, however, an animal has milk fever, there is just one treatment, and it is entirely effective. It consists of pumping the udder full of air (sterilized). This is done by use of the milk fever outfit which every man should have. With every outfit comes directions for using. A tube is inserted in the teat and the udder filled until it is tense; as the tube is withdrawn the teat is tied with a tape to prevent escape of the air. Each quarter is filled this way. One pumping up will usually restore the cow.

Be certain that all implements are sterilized.

Teat Troubles Leaky teats are due to too slack a sphincter muscle at the end of the teat. They are hard to cure.

Hard milking is due to too tense a sphincter muscle, and may be cured by dilatation with a teat plug.

A spider in the teat is a fibrous growth along the milk duct and may permanently close the duct. Not much can be done for it.

A double orifice sometimes occurs in a teat. This, if the two are not close together, may be readily remedied when the cow is dry by scarifying the tissue about one orifice, then stitching it, and allowing it to heal.

Warts are generally removed by tying tightly with a silk thread, by cutting, or by using caustic potash. Treat warts when the cow is dry.

Ropy milk is the result of a bacterial condition, usually arising outside the udder, but the infection may gain access through the teat and the cow actually give ropy milk. It is, however, more a problem of clean surroundings. It probably most frequently arises through water infection.

Flies Flies are a serious problem; it is a debatable question as to whether fly ointments and mixtures are sufficiently effective to pay.

The following mixtures are recommended by those who have experimented and who believe in the use of fly repellants:

No. 1

$\frac{1}{2}$ gallon crude carbolic acid

$\frac{1}{2}$ gallon oil of tar

$\frac{1}{2}$ gallon cottonseed oil

Thoroughly mix and spray.

No. 2

2 gallons creolin

1 gallon cottonseed oil

10 gallons water

Mix and spray.

Sucking Cows Occasionally cows develop the habit of sucking themselves or other cows. The easiest preventive is to put a ring in the cow's nose and attach two or more rings to it.

Whitewash Every dairyman should have a barrel pump sprayer and should know how to make whitewash. The following whitewash formula is given by the U. S. D. A.:

Take one-half bushel of unslaked lime, slake it with boiling water, covering during the process to retain steam. Strain through a fine sieve, add a peck of salt previously dissolved in hot water, and 3 pounds of ground rice boiled to a thin paste and stirred in while hot, $\frac{1}{2}$ pound of Spanish whiting, and 1 pound of clean glue, previously dissolved by soaking in cold water; hang over a slow fire in a pot hung in in a larger one filled with water. Add 5 gallons of hot water to the mixture, stir well; let it stand a few days, keeping out all dirt. It is better applied hot.

By leaving out the Spanish whiting and glue and omitting the boiling a whitewash is made that may be applied cold with a spray pump.

Mange Mange is a disease due to one of four different mites that burrow into the skin, causing itchiness, the hair to fall out, and scabs to form. Thoroughly scrubbing the affected part with a 2% creolin solution, repeating the treatment at ten days, will usually get rid of the mites. With young stock, dipping in a 2% solution as above, is a convenient and effective treatment.

Goitre Goitre consists of the enlargement of the thyroid gland and commonly is known as big-neck. It occurs in particular sections and is probably due to conditions of the water supplied. It is common in calves at birth in some localities. It is overcome by administering a few drops of tincture of iodine about three times a week in the drinking water of the dam for a few months previous to parturition.

Pneumonia Pneumonia is an inflammation of either the lung tissue or the bronchial tissue. It begins with a chill followed by high fever, and usually there is sharp pain in the affected side. The animal is dull and listless, the breathing short, rapid and rasping. Placing the ear to the side over the affected lung, a characteristic raspy, crackling breathing is easily detected.

The animal must be placed in comfortable, clean, dry, well-bedded quarters, which are well ventilated but free from drafts. The body should be well blanketed. The services of a veterinarian should be procured as soon as possible. Good nursing is necessary, and when the animal begins to recover, care should be taken to avoid a second attack.

COMMENDATORY LETTERS

BASSETT JERSEY FARM

Home of Karnaks Jap and Meridale Cowslip's Jap

Ligonier, Ind.

The Quaker Oats Co.,
80 E. Jackson Blvd.,
Chicago, Ill.

Dear Sirs:

We are very glad to tell what we think of Quaker Oats Feed. We think Schumacher Feed one of the finest conditioners for dairy cattle, and have used it with great success in our herd of Jerseys of Imported Jap breeding. When making records we feed a great deal of Schumacher because it is so appetizing.

Majesty's Little Maiden's Junior four-year-old record of 676 lbs. of fat was made with these feeds, with the addition of course, of bran, silage, beet pulp and alfalfa hay. Also The Jap's Fernleaf Queen's record of 598 lbs. fat at one year and ten months was made with the same feeds.

Very truly yours,

AINSWORTH BASSETT.

WADDINGTON FARM

The Quaker Oats Co.,
Chicago, Ill.

Wheeling, W. Va.

Dear Sirs:

We use Schumacher Dairy Feed as a part of our ration both for our regular milking herd and for the cows on test and find it very satisfactory.

Yours very truly,

WADDINGTON FARM,

M. C. Hine, Supt.

The Quaker Oats Co.,
Chicago, Ill.

R.F.D. 2, Conley, Ga.

Gentlemen:

I believe I was one of the first to try a ton of Sugared Schumacher Feed when same was put on the Atlanta market, and from the start the results I have secured in feeding Sugared Schumacher have been most satisfactory, and I have fed it regularly. I CONSIDER SUGARED SCHUMACHER AND C. S. MEAL THE BEST FEED THAT I CAN BUY.

Yours truly,

J. W. CLARK.

The Quaker Oats Co.,
Chicago, Ill.

Spencer, Mass.

Dear Sirs:

Replying to your favor of the 11th instant would state that we have not up to the present time used any of your Sugared Schumacher Feed. We have, however, as you know, used Schumacher Feed at Alta Crest Farms for a great many years.

We now have one of our cows, Douglas Hall Dandy II, on A. R. test, and it may interest you to know that this cow produced during the month of December, 1921, 2,470.9 lbs. of milk and 111.69 lbs. of fat. This fat record we believe to be a World's Monthly Fat Record for any Ayrshire cow. Schumacher Feed is being used in this cow's grain ration as the source of carbohydrates.

Yours very truly,

ALTA CREST FARMS,

Arthur H. Sagendorph.

DETROIT CREAMERY FARMS

The Quaker Oats Co.,
Chicago, Ill.

R. F. D., Mt. Clemens, Mich.

Dear Sirs:

Your letter requesting our idea of the relative value of Sugared Schumacher and Schumacher Feed at hand and will say in answer, that I don't think there is much chance for any real comparison.

We are feeding, at the present time, Sugared Schumacher to 100 dry cows and 250 growing heifers.

We like the Sugared Schumacher so much better than the Schumacher Feed that we do not even consider placing an order for the latter feed.

Yours truly,

DETROIT CREAMERY FARMS,

J. E. McWilliams, Supt.

OAK HILL ESTATE

The Quaker Oats Co.,
80 E. Jackson Blvd.,
Chicago, Ill.

Uniontown, Fayette County, Pa.

Dear Sirs:

We have been feeding your Sugared Schumacher Feed all winter. We prefer it to any other feed as a source of carbohydrates.

Our cows convince us by the way they eat, the way they milk and the profits they return that this feed is their first choice.

Sugared Schumacher Feed formed one-third of our grain mixture for test cows, for the working herd and for young stock.

Yours very truly,

A. A. THOMPSON.

The Quaker Oats Co.,
Chicago, Ill.

Rome, R. D. 5, N. Y.

Gentlemen:

We have used your Schumacher Feed for the last five years with very satisfactory results. This winter we wanted a feed strong in carbohydrates and purchased your Sugared Schumacher and are well pleased with it.

The ration we use in three Sugared Schumacher Feed, one of Gluten Feed with corn silage and alfalfa hay for roughage.

Your customer,

F. G. RATHBUN.

ROKEBY FARM

The Quaker Oats Co.,
Chicago, Ill.

Barrytown, N. Y.

Gentlemen:

I am pleased to state we have been feeding SCHUMACHER STOCK FEED for the past eight years with very satisfactory results, especially with young stock, as a growing ration, and have consistently used it in our milk ration and it has helped us more than any other one feed to keep up a heavy production of milk.

One registered Holstein four-year-old heifer averaged sixty (60) lbs. milk per day, best day 64 lbs. and milked only twice daily.

We are breeding registered Holsteins and aim to grow the young stock well. We have fed Schumacher Feed to horses and hogs with good results.

Respectfully yours,

F. H. WILLIAMS, Supt.

The Quaker Oats Co.,
Chicago, Ill.

Brunswick, Ga.

Gentlemen:

You will be interested in knowing that we have been feeding your Schumacher Feed as the maintenance part of our ration to our dairy herd for the past five years with splendid results.

We have found that Sugared Schumacher Feed mixed properly with cottonseed meal for additional protein gives us the most satisfactory and economical dairy ration that we can buy. Our cows do splendidly on this feed, giving us maximum milk yield—stay in splendid flesh and physical condition and deliver well developed, strong calves. We are glad to give you these few words of endorsement on your reliable result-producing Sugared Schumacher Feed.

Yours very truly,

MIRIAM DENT,

Hofwyl Plantation Dairy.

The Quaker Oats Co.,
Chicago, Ill.

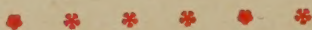
Flat Shoals Road, Atlanta, Ga.

Dear Sirs:

We have been feeding Sugared Schumacher Feed to our cows since last fall. Prior to feeding Sugared Schumacher we were feeding a feed that cost a great deal more but we find that Sugared Schumacher and C. S. Meal give us the most milk for the least money. Also, it keeps our herd in splendid condition. We can, and do, recommend Sugared Schumacher to any dairymen who want the best for the least cost.

Very truly yours,

T. O. & O. E. WHITE.



The Quaker Oats Company,
Chicago, Illinois.

Muscatine, Iowa.

Gentlemen:

I have been feeding Sugared Schumacher ever since the Quaker Oats Co. has manufactured it. Two years ago I took the management of the Hillandale Farm and introduced the feed to all hogs on the place. At the present time we are full-feeding 120 head. I cannot give you cost per pound on this bunch, as same are not finished. The last carload made an average daily gain of $2\frac{1}{2}$ pounds per day for 30 days, at a cost of \$4.85 cwt.

We just unloaded a 20 ton car, and am again in the market for another 20 ton car for future shipment.

To tell you what I think of Sugared Schumacher, will say, that when you can feed sows suckling an average of eight pigs, wean the pigs and drive the sows into a truck and top the packing hog market for that class you must be feeding something unusually good; we have accomplished this twice in the past two years.

You can always find Sugared Schumacher Fed Hogs with hair like silk hats at Hillandale Farm.

Very truly yours,

HILLANDALE FARM,

(Signed) Chas. W. Hendriks, Supt.

SUGARED SCHUMACHER FEED FOR HOGS

Because carbohydrates are the essential and major portion of correct rations for swine of all ages, **Sugared Schumacher Feed** makes a particularly suitable feed for this class of stock.

Sugared Schumacher Feed insures success in pork production. It affords relief from exclusive corn feeding. It produces remarkable growth, develops a strong, bony framework, and gives a fullness of vigor that always results in profitable returns.

From the time pigs will eat grain until they are within four weeks of marketing, let half of their grain ration be **Sugared Schumacher Feed**.

For brood sows use a ration consisting of:

9 parts **Sugared Schumacher Feed**
1 part Tankage

For Growing Pigs, use:

1 part **Sugared Schumacher Feed**
2 parts Skim Milk

Or

10 parts **Sugared Schumacher Feed**
1 part Tankage

For Fattening Pigs use:

20 parts **Sugared Schumacher Feed**
1 part Tankage

Or

10 parts **Sugared Schumacher Feed**
10 parts Corn
1 part Tankage

Or allow free access to these feeds in the self-feeder.

On good clover or alfalfa pasture **Sugared Schumacher Feed** alone is a very fine feed for brood sows or growing stock.

The Feeds for All Needs



A BLENDED SWEETENED
CARBOHYDRATE FEED

A COMBINATION OF THE
CHOICEST HIGH PROTEINS

Fed in Combination these Feeds Meet Every Feed Need